



City of Augusta
Georgia

Flood Hazard Mitigation Plan

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Executive Summary

Augusta, Georgia, undertook development of this *Flood Hazard Mitigation Plan* (“the Plan”) because of increasing awareness that flood hazards may affect many people and properties in the area. The Plan is a requirement associated with receipt of certain federal mitigation grant program funds administered by the Georgia Emergency Management Agency. In addition, the Plan is a pre-qualification of eligibility for other mitigation funds.

The Plan was prepared by City staff representing the Augusta-Richmond County Planning Commission, License & Inspection, Public Works & Engineering, Emergency Management, the Fire Department, Augusta Utilities, Housing & Neighborhood Development, Recreation & Parks, Information Technology, and the Finance Department. State and federal agencies were notified and invited to attend.

Augusta has experienced a number of flood events with increased frequency and severity in recent years. Although not generally resulting in damage to buildings, drainage problems often result in water on major roads and present risks to the traveling public. Flood hazard areas are found along all waterways, including the Savannah River and urban streams. The U.S. Army Corps of Engineers operates flood controls on the Savannah River, but there remains a low probability of significant flooding. Downtown Augusta is protected by the Augusta Levee which provides protection along the Savannah River from the boundary with Columbia County downstream to the New Savannah Lock and Dam.

The urban streams where flooding has caused the most damage include Rae’s Creek, Cranes Creek, Rock Creek, Augusta Canal, Rocky Creek, and Oates Creek. In the rural parts of the City, less development has encroached into floodplains. The City has some expansive flood-prone areas on the City’s eastern side, notably the Phinizy Swamp and below the Savannah Lock and Dam where the Savannah River floodplain is no longer modified by the Levee.

This *Flood Hazard Mitigation Plan* sets the stage for long-term disaster resistance through identification of actions that will, over time, reduce the exposure of people and property to natural hazards. Sections of the Plan:

- Provide overviews of the flood hazards that threaten the City,
- Characterize the people and property that are exposed to some risk due to flood hazards,
- Outline the planning process,
- Describe how flood hazards are recognized in the City's normal processes and functions, and
- Identify priority mitigation action items.

Using the City's Geographic Information System data on buildings and comparing that data to the most recent flood hazard maps prepared by the Federal Emergency Management Agency, about 3,700 buildings are exposed to some degree of flood hazard. Generally, in recent years, flooding has resulted from localized and intense storms that do not affect all waterways. Some areas have flooded repetitively in the past ten years. Unfortunately, as of mid-2003, fewer than 20% of buildings that are in flood hazard areas are covered by flood insurance.

The City of Augusta recognizes that long-term flood hazard avoidance begins with sound land use management. Prior to consolidation, the City and Richmond County adopted floodplain management ordinances. In response to flood events, the ordinance was modified significantly in 1991 and 2000, most recently to increase freeboard and strengthen grading and "no rise" requirements. The City emphasizes guiding development away from floodways and that portion of the flood fringe that is defined as the "lower floodway fringe." With respect to existing flood-prone development, the City has received mitigation grant funds to support acquisition and demolition of 22 homes in the most flood-prone areas. The initiative is expected to continue as funding becomes available.

To address the identified hazards and flood-related impacts on citizens, public safety, and the City's infrastructure, eleven actions are identified in the Plan. The citizens of Augusta will benefit as progress is made toward

the City's mitigation goal over the next 5–10 years. The priority actions are related to:

- Drainage and Stormwater Management
- Flood Warning
- Public Awareness Initiative
- Flood Hazard Map Revisions and Updates
- Flood Mitigation Projects
- Soil Erosion and Sediment Control
- Flood Mitigation Staffing
- NFIP Community Rating System
- Sewer Line Infiltration & Inflow
- Savannah River Flood Protection & Awareness
- Dam Safety

Two public meetings on consecutive nights were held near the beginning of the mitigation planning process to introduce the concept of mitigation planning and to invite public comment. The final draft plan was scheduled to be presented at another public meeting and was made available for comment on the City's web site, in the Augusta-Richmond County Planning Commission's office, and in the Main Branch of the Public Library located on Greene Street. Notices of all public meetings were sent by mail or e-mail to adjacent communities, federal and state agencies, and numerous neighborhood associations. Public notices were placed in the *Augusta Chronicle* and posted on the City's web site.

The Plan was presented and adopted in Draft Form in September 2003. The final Plan, as reviewed and approved by the Federal Emergency Management Agency, was presented and adopted at a public session of the Augusta Commission on February 17, 2004.

Resolution of Adoption

Resolution of Adoption (page 1)

Copy of executed resolution provided after adoption

Resolution of Adoption (page 2)

Copy of executed resolution provided after adoption

Part 1

Introduction

1.1 Introduction

The City of Augusta, GA undertook development of this *Flood Hazard Mitigation Plan* (“the Plan”) because of increasing awareness that natural and man-made hazards, especially flood hazards, may affect many people and property in the area. The Plan is a requirement associated with receipt of certain federal mitigation grant program funds administered by the Georgia Emergency Management Agency. In addition, the Plan is a pre-qualification of eligibility for other mitigation funds.

1.2 Authority

The Augusta Emergency Management Agency and the Augusta-Richmond County Planning Commission were designated by the Mayor and the Augusta Commission to coordinate with other appropriate departments and agencies to facilitate the development of the Plan in conformance with state and federal guidelines.

The Plan was prepared pursuant to the Flood Mitigation Assistance Program (44 CFR 78.6) and the process outlined in materials prepared by the Federal Emergency Management Agency for the Community Rating System of the National Flood Insurance Program.

1.3 Planning Area

In 1996, the City of Augusta and Richmond County consolidated governments and is now known as the City of Augusta, located in central eastern Georgia (Figure 1-1). The *Flood Hazard Mitigation Plan* is prepared for the entire City (Figure 1-2), but excludes the cities of Hephzibah and Blythe, both located in the southwestern quadrant. Also excluded is Fort Gordon, a federal military installation.

Augusta is a central city in the Augusta-Aiken, GA-SC Metropolitan Statistical Area. Other counties in the MSA are Columbia and McDuffie in Georgia, and Aiken and Edgefield in South Carolina.

Today, the City of Augusta comprises 152,072 acres (the former City was 13,108 acres and the former County was 139,964 acres). The total area is



1.3.1 Geography and Climate

The topography of the Augusta-Richmond County area consists chiefly of rolling hills, with occasional steep hills. The soils within the watersheds and floodplains are composed of highly erodible, coarse sands.

Elevations of the terrain vary from approximately 110 feet in the swampy areas adjacent to the Savannah River to a maximum of approximately 520 feet in the headwaters.

In the east portion of Georgia, large storms that produce flooding are usually of the frontal type, lasting 2 to 4 days and affecting large areas. Summer thunderstorms with high rainfall intensities may result in local flooding. The City is vulnerable to storms associated with hurricanes and tropical storms that move through the area, primarily in late summer and early fall.

1.3.2 Population and Growth

Augusta's population and household characteristics reflect those of an older city that has merged with new suburbs (see Table 1-1). Compared to other counties in the MSA and the rest of the state, the City's growth rate between 1990 and 2000 is relatively low at 4.4% (even slower than for the period 1980-1990). The state as a whole has experienced a 26.4% growth in population.

Table 1-1
Population Trends (1980-2000).

	1980	1990	2000	Growth for 1990-2000
Richmond County	132,280	142,314	195,182	4.4%
City of Augusta	47,532	44,639		
Ave Household Size	2.61	2.44	2.55	

Based on the results of the 2000 census, the City estimates a total of 72,307 households (up from 67,752 in 1990). Historically, development was concentrated around the Savannah River and trading routes. Modern transportation, especially railroads, spurred growth to the south and west. In the twentieth century, the City annexed incorporated places and

unincorporated areas. Rural patterns characterized most of Richmond County until about the 1940s. Suburban development began in earnest following World War II and continued to the present. The character, age and condition of the housing stock reflect these trends and the expansion of commercial and industrial facilities that accompanied that growth.

The total number of parcels of land changes regularly, especially when subdivisions are created. However, as of mid-2003, a total of 75,281 parcels were platted in the land records (and available in the City's computer mapping, see Section 5.1). At this time, limitations of the database do not allow determination of the number of vacant parcels, which is only one indication of growth potential.

Table 1-2
Number of Land Parcels.

Commission District	Total Parcels
District 1	11,438
District 2	10,243
District 3	8,067
District 4	8,279
District 5	8,585
District 6	8,502
District 7	9,008
District 8	11,159
Total	75,281

In 1992, a survey of land uses indicated that for the County as a whole (including Hephzibah and Blyth, but excluding Fort Gordon):

- 14% was residential;
- 3% commercial;
- 3% industrial;
- 16% other uses; and
- 70% was farming, forestry, and undeveloped.

Residential land uses cover approximately 28,000 acres, including:

- A mix of 1- and 2-family family, site-built homes at various densities (68.6% of all housing units);
- Multi-family buildings, including apartments (22.3%);
- Manufactured housing (9.2%); and
- Boats, RVs, other (0.1%).

The bulk of housing units were built before 1979 (66%). This is notable because the City (urban district) began managing mapped floodplain areas in 1978 and the County (suburban district) began in 1980. Thus, it is expected that the majority of homes in flood hazard areas pre-date publication of flood hazard maps and application of floodplain regulations. In 2000, the median value of owner-occupied housing units was \$76,800.

Augusta has a diversified economy, with the approximately 75% of employment in the service, retail trade and manufacturing sectors. Manufacturing facilities produce textiles, paper products, chemicals, transportation equipment, and food products. Retail is concentrated downtown and in shopping centers on major roads, with some individual sites. The large commercial Augusta Mall and Augusta Exchange draw customers from throughout the region.

Major employers in the service sector include health care and related facilities, educational institutions, and service businesses. Eight hospitals and numerous ancillary facilities provide a wide range of jobs. Major educational institutions providing employment include the Medical College of Georgia, Paine College, Augusta State University, Augusta Technical College, and the Richmond County Board of Education.

Fort Gordon is the home of the U.S. Army Signal Center, the world's largest training facility for communications and electronics. The Fort accounts for employment of about 17,000 area residents, 10,000 of whom live off base. The Savannah River Site, located in South Carolina, is a key Department of Energy nuclear installation that draws employees from throughout the area, including approximately 1,600 residents of Augusta.

1.4 Planning Committee Membership

The formal Mitigation Planning Committee is composed of:

- Tommy Boyles, Commissioner
- Andy Cheek, Commissioner
- Fredrick Russell, Assistant County Administrator
- Chief Howard Willis, Emergency Management
- George Patty, Executive Director, Planning Commission
- Terri L. Turner, Assistant Zoning & Development Administrator, Planning Commission

The following City departments and offices are tasked to support the Mitigation Planning Committee:

- | | |
|-----------------------------------------------|--------------------------------------|
| ▪ Planning Commission – Floodplain Management | ▪ Augusta Utilities |
| ▪ License & Inspection | ▪ Housing & Neighborhood Development |
| ▪ Public Works & Engineering – City Engineer | ▪ Recreation & Parks |
| ▪ Emergency Management/Fire Department | ▪ Information Technology |
| | ▪ Finance Department |

The following agencies were notified, invited to participate, and asked to review and comment on the Plan:

- Georgia Emergency Management Agency
- Georgia Department of Natural Resources, NFIP State Coordinating Office
- Georgia Department of Transportation
- Federal Emergency Management Agency – Region IV
- Natural Resources Conservation Service – Augusta

1.5 Acknowledgments

The Plan was supported by a planning grant provided by the Federal Emergency Management Agency and administered by the Georgia Emergency Management Agency. The City of Augusta appreciates the advice and encouragement of both agencies.

The City of Augusta's *Flood Hazard Mitigation Plan* was facilitated by Rebecca C. Quinn, CFM, of RCQuinn Consulting, Inc., Annapolis, MD.

1.6 Key Terms

For the most part, terms used in the Plan have the meanings that are commonly associated with them:

- **Disaster** means the occurrence of widespread or severe damage, injury, loss of life or property, or such severe economic or social disruption that supplemental disaster relief assistance is necessary for the affected political jurisdiction(s) to recover and to alleviate the damage, loss, hardship, or suffering caused thereby.
- **Federal Emergency Management Agency (FEMA)** coordinates the federal government's efforts to plan for, respond to, recover from, and mitigate the effects of natural and man-made hazards.
- **Flood Insurance Rate Map (FIRM)** is prepared by the Federal Emergency Management Agency to show Special Flood Hazard Areas; this map is the basis for regulating development.
- **Floodplain.** See "Special Flood Hazard Area (SFHA)" below
- **Hazard** is defined as the natural or technological phenomenon, event, or physical condition that has the potential to cause property damage, infrastructure damage, other physical losses, and injuries and fatalities.
- **Mitigation** is defined as actions taken to reduce or eliminate the long-term risk to life and property from hazards. Mitigation actions are intended to reduce the need for emergency response – as opposed to improving the ability to respond. Also see Section 2.5 for the State's definition.
- **National Flood Insurance Program (NFIP)**, located within FEMA, is charged with preparing FIRMs, developing regulations to guide development, and providing insurance for flood damage.
- **Risk** is defined as the potential losses associated with a hazard. Ideally, risk is defined in terms of expected probability and frequency of the hazard occurring, people and property exposed, and potential consequences.
- **Special Flood Hazard Area (SFHA) or Floodplain** is the area adjoining a river, stream, shoreline, or other body of water that is subject to partial or complete inundation. The SFHA is the area predicted to flood during the 1% annual chance flood, commonly called the "100-year" flood.

1.7 Acronyms

The following acronyms are used in the document:

- **CRS** – Community Rating System (NFIP)
- **FEMA** – Federal Emergency Management Agency
- **FIRM** – Flood Insurance Rate Map
- **FIS** – Flood Insurance Study
- **FMA** – Flood Mitigation Assistance (FEMA)
- **GEMA** – Georgia Emergency Management Agency
- **GIS** – Geographic Information System
- **HMGP** – Hazard Mitigation Grant Program (FEMA)
- **NFIP** – National Flood Insurance Program (FEMA)
- **PDM** – Pre-Disaster Mitigation Grant Program (FEMA)
- **SFHA** – Special Flood Hazard Area

1.8 References

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Part 2

Introduction to Mitigation Planning

2.1 Introduction

An important step in the lengthy process of improving resistance to hazards is the development of a Hazard Mitigation Plan. The City of Augusta's *Flood Hazard Mitigation Plan* was prepared in accordance with the guidelines provided by the Federal Emergency Management Agency, advice from the Georgia Emergency Management Agency (GEMA), and steps outlined in guidance documents for the National Flood Insurance Program's (NFIP) Community Rating System (see Section 2.4).

The *Flood Hazard Mitigation Plan* serves several purposes. It sets the stage for long-term resistance to flooding through identification of actions that will, over time, reduce the exposure of people and property. In addition, the City may seek recognition under the NFIP's Community Rating System, and the Plan will provide additional credit. Further, the Plan will be the basis on which the City develops a Multi-Hazard Mitigation Plan in order to establish eligibility for certain mitigation grant funds.

Sections of the Plan provide overviews of the flood hazards that threaten the City, the people and property exposed to flood hazards, the planning process, how flood hazards are recognized in the City's normal processes and functions, and priority mitigation action items. The hazard summary and disaster history help to characterize future hazards. When the magnitude of past events, the number of people and properties affected, and the severity of damage, flood hazards clearly are the most significant natural hazard to threaten Augusta.

This Plan acknowledges that many buildings were built before the adoption of regulations for development in floodplains in both the City of Augusta and Richmond County prior to consolidation. Current regulations require new development to recognize anticipated flood hazards. Older buildings, then, may reasonably be expected to sustain more property damage than new buildings.

2.2 The Mitigation Planning Process

The City of Augusta followed a well-established planning process to develop this *Flood Hazard Mitigation Plan* and to fulfill multiple requirements. Four meetings of the Mitigation Planning Committee were held (summary notes from meetings are in Appendix A):

- **June 23, 2003.** Overview of the mitigation planning process, prevalent natural hazards, losses and costs associated with recent events, discussion of opportunities for public comment, introduction to examples of mitigation actions.
- **June 27, 2003.** Review generally what is known about flood hazards (estimate based on GIS mapping), roles and responsibilities of each department with respect to flood hazards, ongoing Corps of Engineers studies (especially Rae's Creek and Rocky Creek) and focus on nonstructural alternatives, report on the Levee closing exercise, discussion on ways the City communicates with the public, a first-draft goal statement, and discussion on possible mitigation actions.
- **August 12, 2003.** Finalize the mitigation goal statement; review and revise potential mitigation actions, agree on the mitigation goal statement, review risk information, comment on Draft Plan.
- **August 27, 2003.** Review public comments; revisit mitigation actions and assign priorities; designate lead agencies, effectiveness statements, barriers and limitations; approve Draft Plan and forward it to the Augusta Commission, GEMA, and FEMA.

The overall mitigation planning process, summarized below, was facilitated by a mitigation planning consultant:

- **Get Organized.** Augusta's Planning Commission and the Emergency Management Agency were charged with coordinating a committee comprised of City departments that are responsible for permits, subdivision approvals, neighborhood and community development, recreation, parks, utilities, and public works.
- **Coordinate.** Prior to the first Committee meeting, the following agencies were notified of the planning activity and invited to participate:
 - Georgia Emergency Management Agency, Georgia Department of Natural Resources (NFIP State Coordinator), Georgia Department of Transportation.
 - FEMA Region IV, U.S. Army Corps of Engineers – Savannah District, and the Natural Resource Conservation Service.
- **Identify Hazards.** Interviews were conducted with City department representatives to understand how members of the Committee perceive

the impacts past events have had and how hazards are incorporated into routine responsibilities (detailed notes on the interviews are on file in the Planning Commission). Flood maps prepared by FEMA can be used to show flood-prone areas, although some areas not shown are known problem areas. A number of dams are located within the City and on waterways that drain through the City. Hazardous materials are generally confined to fixed facilities or within defined transportation corridors.

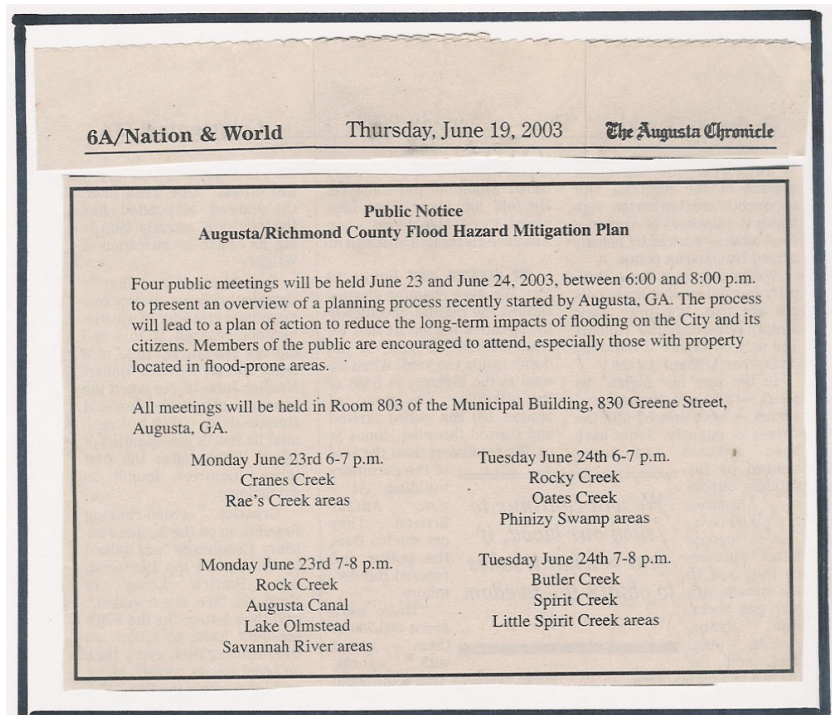
- **Review How Flood Hazards are Addressed.** During interviews, the roles of each program were described with respect to whether and how flood hazards are included in routine functions. The results are summarized in Section 6.
- **Assess Risks.** For the purpose of this Plan, site-specific and detailed risk assessments were not prepared. The available floodplain mapping is the Flood Insurance Rate Maps (panels are dated February 1987, January 1995, and March 1999). The City's GIS uses the digital version of the FIRM (Q3 Flood Data). The U.S. Army Corps of Engineers is developing new floodplain mapping for four watersheds (see Section 7.4.1) and FEMA has indicated that revision of the City's maps is a high priority under the Map Modernization Program recently funded by the U.S. Congress.
- **Create Goal Statement.** The mitigation goal statement was discussed during the second meeting, approved at the third meeting, and confirmed in the final meeting.
- **Review Mitigation Actions.** A list of tentative mitigation actions was prepared based on meetings and interviews as well as knowledge of successful actions implemented in other communities. The list was distributed to staff and discussed in detail during the third meeting. Changes were made and a revised list was distributed for members to indicate priorities (Drop, No Opinion, Low, Medium, High) based on their program's functions and priorities. The priorities were compiled into the list shown in Part 8.
- **Draft Action Plan.** Information collected and notes from meeting discussions were compiled into a format designed to fulfill various planning requirements. The draft was circulated to Mitigation Planning Committee members and staff and electronic copies were provided to adjacent communities and pertinent state and federal agencies. Comments were collected and incorporated and a final draft was circulated.
- **Hold Public Meetings.** On June 23 and 24, 2003, two public meetings were held to introduce the planning process to interested citizens. A notice of availability of the Public Review Draft Plan was published in the *Augusta Chronicle* on August 14, 2003. The Draft Plan was

presented at the public meeting held on August 26, 2003. Additional detail is provided in Section 2.2.

- **Adopt Plan.** A copy of the resolution of adoption is bound into this Plan.

2.3 Public Involvement in Mitigation Planning

Consistent with the City's standard practice to inform and provide citizens the opportunity comment, and to fulfill the public involvement requirements of the mitigation planning programs, the City solicited input and notified and invited residents to review the Plan and attend a public meeting. On May 20, 2003, a letter advising that the City was initiating the planning process, including a public meeting, was sent to selected state and federal government agencies, neighborhood associations and other interested and related organizations, and citizens who have contacted the Planning Commission regarding flooding problems.



2.3.1 Public Meeting – Introduction

The first public meetings on June 23 and 24, 2003, were advertised in *The Augusta Chronicle*, on the City's Comcast public access channel, and by a number of local news media. Notices were posted at the City Commission Chambers, the front door of the municipal building, and the front door of the Planning Commission office. Detailed notes of the meetings, including citizen comments, are in Appendix B. Also included is a copy of the questionnaire that was distributed and a summary of citizen responses. Examples of comments include:

-
- Past channel work and drainage maintenance has been negated by build-up of sediment.
 - Several houses have been abandoned or have been vacant since the early 1990s due to repetitive flooding.
 - Georgia DOT work and big commercial developments have increased runoff and amount of sediment in the channel.
 - Lakes are filling with sediment, pushing water into yards more frequently.
 - Need public access along Cranes Creek and Rae's Creek so that citizens can monitor the waterways
 - Parts of the City are in great need of greater preservation of greenspace.
 - Who makes decisions on buyouts? What are the criteria? Is a list of eligible property owners maintained?
 - Flood insurance is too expensive.

2.3.2 Public Questionnaire

A questionnaire was prepared to solicit input from citizens about flood hazards and mitigation ideas. The questionnaire (Appendix B) was posted on the City's web page and distributed during the public meeting. A summary of responses is included in Appendix B; highlights include:

- Many waterways are clogged with sediment, causing them to overflow more frequently.
- Dredge creeks and Lake Olmstead (where bar of sand has built up).
- Buyout more of the damaged homes and allow the land to be wet and Greenspace.
- One side of the creek is 3-4' lower; even out the height of streambanks.
- Improve drainage from roads to ditches; keep ditches cleaned of debris and heavy grass.

2.3.3 Final Public Meeting

The City of Augusta's *Flood Hazard Mitigation Plan* (Public Review Draft) was scheduled for presentation to the public at a meeting on August 26, 2003. Notice of the meeting was published in the August 14 edition of the *Augusta Chronicle*. Prior to the meeting, copies of the Public Review Draft were made available to the public in Augusta-Richmond County Planning Commission office, at the Main Branch of the Augusta-Richmond County Public Library on Greene Street, and

posted on the City’s webpage. A notification letter was sent to adjacent communities, federal and state agencies, and neighborhood associations. Despite these efforts, members of the public did not attend the meeting.

2.3.4 Public Sessions of the Commission

The “Information Only” version of the *Flood Hazard Mitigation Plan* was on the September 8, 2003, agenda of the Engineering Services Committee of the Augusta Commission. At its September 16, 2003 meeting, the Commission discussed the Plan and directed the Augusta Emergency Management Agency, with support from the Planning Commission, to forward the Plan to the Georgia Emergency Management Agency for appropriate action.

The *Flood Hazard Mitigation Plan* was presented for adoption during the February 17, 2004 public session of the Augusta Commission and adopted effective immediately.

2.4 Augusta’s 1998 Mitigation Plan

The Hazard Mitigation Plan (May 1998) was prepared following guidelines and a template offered by the Georgia Emergency Management Agency. It does not satisfy planning requirements in effect as of 2003 because it was not prepared in a manner consistent with the process outlined in recent FEMA programs.

The Plan provides an overview of mitigation and how it “fits” in the emergency management cycle: mitigation, preparedness, response, and recovery. The purposes of the Plan were stated: evaluate hazards; describe local programs and capabilities; establish goals and objectives; identify mitigation strategies, programs and actions; and institute a method to implement, monitor, evaluate and update the plan.

The Plan includes a table that lists significant events that resulted in damage and 12 hazards are briefly described. Other than a review of past events, no other evidence of the people and property that are exposed to those hazards is provided. The hazards were qualitatively ranked, reflecting the “level and likelihood of impact,” and resulted in the

following order: hazardous materials; flood; storms/lightning; tornadoes; airplane crash; severe winter storm; hurricane; agricultural drought; wildfire; earthquake; dam failure; and subsidence.

A standardized format “capabilities assessment questionnaire” was completed. The results are a listing of general information, titles and dates of documents and regulations, and lists of facilities. Potential areas of opportunity for improvement were identified:

- The EOP partially addresses people with special needs;
- SOPs for hazardous materials and/or radiological incidents need improvement;
- Only 70-84% of the population can be alerted within 30 minutes; and
- Insufficient radiological equipment.

Ten projects were listed as “planned,” ranging from channel improvements, detention basins, weather monitoring, shelter-in-place kit pilot project; outreach on chemical preparedness; and drainage improvements.

2.5 The State Mitigation Plan

The State of Georgia has long been aware that it is exposed to a variety of natural hazards. Of particular concern are flood hazards associated with thunderstorms, northeasters, hurricanes, and tropical storms. Other hazards are listed: tornadoes; drought; wildfire; severe winter storms; earthquakes and subsidence; and dam failure. The *Georgia Hazard Mitigation Strategy – 2000* (which is an update to the 1999 *Hazard Mitigation Plan*) was reviewed and highlights are described (below).

Originally prepared by the Georgia Emergency Management Agency to fulfill the requirements set forth by Congress in the Stafford Act (Section 409), the State’s *Hazard Mitigation Plan* is being reviewed and revised to satisfy planning requirements prompted by the Disaster Mitigation Act of 2000.

The Strategy is intended to provide a framework for hazard mitigation strategies and actions undertaken by local and state government. Goals

(see Section 3.2), objectives and recommendations will be used to initiate the development of long-range, comprehensive, multi-hazard mitigation activities to be administered by GEMA. A structure through which GEMA will pursue the additional funding made available through the Stafford Act amendments of 2000 is set forth.

As described in the Strategy, GEMA considers that mitigation refers to activities that reduce or eliminate the threat, occurrence, or the effects of natural hazard events or disasters. Mitigation activities serve to protect public health and property, and help to break the damage-repair cycle of rebuilding in hazardous areas. Several broad approaches to mitigation are listed:

- Emphasizing the use of non-structural methods such as acquisition of floodplain structures and rigorous enforcement of local floodplain ordinances.
- Preventing or limiting development in vulnerable and hazardous areas.
- Altering the design or construction of development or redevelopment to make it less vulnerable to known hazards.
- Utilizing structural measures to protect life and property.
- Educating the population via public information, training, exercises, and advanced warning and communications in order to reduce the impact of hazard events.

Consistent with the State's mitigation goals and objectives, GEMA identifies three distinct areas for action and specific measures are listed:

- Increasing coordination between GEMA and other state agencies in order to promote hazard mitigation;
- Increasing the warning and communication capabilities for both state and local jurisdictions to cover at least 98% of the population at risk to the various hazards; and
- Identifying mitigation projects at the local level.

The Strategy provides a brief summary of several state agencies and programs that have bearing on mitigation (see Section 2.5), including the Georgia Emergency Management Agency, Department of Natural Resources, Department of Community Affairs and the Forestry Commission. Ten federal agencies that may have bearing on mitigation

activities are described briefly: Federal Emergency Management Agency, US Army Corps of Engineers, Department of Agriculture (Natural Resources Conservation Service), Department of Transportation (Federal Highway Administration), Department of Agriculture (Farmers Home Administration), Small Business Administration, Department of Housing and Urban Development, US Geological Survey, Department of Commerce (National Weather Service, National Oceanographic & Atmospheric Administration), and National Park Service.

2.6 Federal Mitigation Planning Requirements

Requirements for mitigation planning are set forth in four programs administered by the Federal Emergency Management Agency. These are described below. Although slightly different, all programs outline the same basic planning process (described in Section 2.1). The City of Augusta's Plan is intended to satisfy the basic requirements for the Flood Mitigation Assistance Program while laying the groundwork for future revisions to satisfy other requirements:

- **Flood Mitigation Assistance Program.** To qualify to receive grant funds to implement projects such as acquisition or elevation of flood-prone homes, local jurisdictions must prepare a Mitigation Plan. The Plan must include specific elements and be prepared following the process outlined in the NFIP's Community Rating System.
- **Hazard Mitigation Grant Program.** By November 2004, to qualify for post-disaster mitigation funds, local jurisdictions must adopt a Mitigation Plan that is approved by FEMA.
- **Pre-Disaster Mitigation Grant Program.** By November 2003, to qualify for pre-disaster mitigation funds, local jurisdictions must adopt a Mitigation Plan that is approved by FEMA.
- **NFIP's Community Rating System (CRS).** The CRS offers recognition to communities that exceed minimum requirements of the National Flood Insurance Program. Recognition comes in the form of discounts on flood insurance policies purchased by citizens. The CRS offers credit for Mitigation Plans that are prepared according to a multi-step process.

Part 3

Mitigation Goal Statements

3.1 Introduction

State and federal guidance and regulations pertaining to mitigation planning require the development of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards. Mitigation goals have been established by the Federal Emergency Management Agency, the Georgia Emergency Management Agency, and the City of Augusta.

3.2 Augusta's Mitigation Goal

State and federal guidance and regulations pertaining to mitigation planning require the development of a mitigation goal statement that is consistent with other goals, mission statements and vision statements. The Mitigation Planning Committee reviewed FEMA's national mitigation goals, several examples of goal statements from other states and communities, and the Georgia State Mitigation Goal. The committee also considered information about natural hazards that may occur in the City and their potential consequences and losses. The final mitigation goal statement is as follows:

The City of Augusta

Flood Hazard Mitigation Goal Statement

It is the goal of the City of Augusta, Georgia, to protect public health, safety and welfare and to reduce losses due to flood hazards:

- *By identifying flood hazards and drainage problems;*
- *By guiding development away from flood hazard areas to support preservation of greenspace and sensitive areas;*
- *By identifying and pursuing mitigation measures to reduce exposure of citizens and property to flood hazards; and*
- *By increasing the public's awareness of their obligations and responsibilities for personal planning, preparedness and recovery.*

The Mitigation Planning Committee discussed the value of making the goal statement broad to allow for comprehensive interpretation of its phrasing, for example:

- “Protect health, safety, and welfare” is broad enough to include the concept of applying development controls (permits) to avoid development in floodplains and, if avoidance is not feasible, to build according to regulations that reduce the potential for damage. The phrase is also broad enough to include undertaking projects intended to deal with specific properties, such as administering grants for acquisition, protecting park buildings, or working with others if a structural flood control project is deemed appropriate.
- The statement clearly distinguishes between new and existing development. The second bullet is focused on new development while the third bullet is specific to dealing with existing people and property that are exposed to flood hazards; in this statement “property” includes private property and public property and infrastructure.
- The last bullet is distinctly different in that it is directly related to what citizens can do – mitigation is a partnership. Citizens have obligations to comply with rules (for example, to dispose of yard waste properly rather than dump in drainageways and to obtain permits). Citizens have responsibilities to take reasonable preventive actions to protect themselves and their property and to facilitate their own recovery. In this context, “responsibilities” apply to safety (such as not driving through flooded roads); property protection (such as modifying buildings or how flood-prone space is used); and financial protection (buying flood insurance).

3.3 Georgia’s Mitigation Goals

The Georgia *Hazard Mitigation Plan* (409 Plan) was revised and approved in 1999; the *Georgia Hazard Mitigation Strategy – 2000* was prepared as an update to incorporate additional disasters. The documents were prepared pursuant to Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended). As of mid-2003, the Georgia Emergency Management Agency is revising the plan to address new requirements.

Georgia State Mitigation Goals

The State established three complementary mitigation goals:

- *Protect public health and safety;*
- *Reduce the property and infrastructure losses and damage from disasters; and*
- *Lessen citizen, community and the State of Georgia's overall exposure to natural hazard events.*

Georgia Hazard Mitigation Strategy (2000)

These goals are supported by four primary objectives for implementation; in addition, the Plan lists a series of tasks under each objective:

- Increase coordination between local, state, and Federal agencies in pre-disaster planning and post-disaster recovery to include continuous hazard mitigation implementation.
- Increase awareness of hazard mitigation among local government and state government agencies, municipalities, businesses, private organizations and the general public.
- Implement a broad range of programs and projects that promote the state's comprehensive mitigation strategy.
- Improve the state's comprehensive mitigation strategy by periodic analysis to determine effectiveness of program management, local and state mitigation projects, planning and initiatives.

3.4 FEMA's Mitigation Goal

FEMA's mitigation strategy is set forth in a document originally prepared in the late 1990s. This strategy is the basis on which FEMA implements mitigation programs authorized and funded by the U.S. Congress. The national mitigation goal statement is as follows:

- To engender fundamental changes in perception so that the public demands safer environments in which to live and work; and
- To reduce, by at least half, the loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural disasters.

Part 4

Hazards in Augusta

4.1 Introduction

Between 1965 and 2003, the State of Georgia has experienced 21 natural hazard events that were of sufficient magnitude that they were declared major disasters by the President: 9 were for tornadoes (some including flooding impacts); 6 for flood; 4 for winter storms; 1 hurricane; and 1 dam failure. Of those declared events, only 2 flood disasters included the City of Augusta. Major disaster declarations are only one measure of a community's hazards and risks.

The following subsections provide an overview of past hazard events and associated losses. Natural hazards other than flood hazards are not addressed, and risks associated with those hazards are not estimated. However, it is apparent that flooding poses the most significant risk in Augusta. Part 5 outlines flood hazards, past flood events, and summaries of the people and property that are at-risk.

4.2 Overview of Risks

Damage and losses (including physical damage, indirect and economic losses, and injuries and deaths) that are associated with hazards result when an event affects the areas where people and improved property are located. After hazards are identified, then estimates of the degree to which people and property are exposed (how “at-risk”) can be prepared, especially if the hazards can be characterized by areas on a map.

When the full range of possible natural hazards is reviewed, it becomes apparent that some events occur frequently and some are extremely rare. Some hazards impact large numbers of people to a limited degree (e.g., winter storms), while others may cause very localized but very significant damage (e.g., tornadoes). As described in Part 5, there is ample evidence floods have historically affected more people and caused more property damage than caused by other natural hazards in Augusta, GA.

4.2.1 Weather-Related Deaths

The National Climatic Data Center, an agency of the National Oceanic and Atmospheric Administration, maintains records of reported weather events, including floods, tornados, thunderstorm winds, severe winter

storms, and lightning. The database extends back to 1950, although many more records are available for the last two decades. This is due to increased density of observation stations and population increases which result in more people exposed to weather events. The database is online at <http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes.html> (under “Local Storm Events”). A summary of deaths and injuries in the State of Georgia and Augusta/Richmond County is shown in Table 4-1.

Table 4-1
Weather-Related Deaths and Injuries (1950-2003).

Hazard (# of reported events)	State of Georgia		Augusta & Richmond County	
	Deaths	Injuries	Deaths	Injuries
Flood (513)	29	16	0	0
Tornado/winds (371)	129	2,843	1	21
Lightning (410)	14	146	0	1

4.3 Public Awareness of Flood Hazards

The *Augusta Chronicle*, with region-wide distribution, has covered stories about flooding and drainage problems for years. Over 100 such stories have been printed since 1997; most were related to the floods in 1998 and 2000. Stories have focused on:

- Local flooding in numerous watersheds;
- Flood-prone roads and related incidents;
- The City’s efforts to regulate flood-prone areas;
- Funding shortfalls to accomplish drainage projects;
- Federal flood insurance; and
- The City’s plans and implementation of projects to buyout flood-damaged homes.

Even when media coverage of floods is extensive, many flood victims tend to discount the likelihood that flooding will occur again. This tendency is attributed to a general lack of understanding of probability (see Comparing Risks, below). All too often, people interpret the phrase “100-year storm” to mean that it only occurs once every 100 years, rather

than that such an event has a 1-in-100 chance of happening each year. FEMA reports that, based on insurance statistics, a building in the floodplain is five times more likely to be damaged by flood than to sustain major damage by fire.

The public becomes aware of local hazards in a number of ways. For example, public awareness of flood hazards is enhanced during the following activities:

- Buying property in a floodplain triggers the federal requirement to obtain flood insurance when obtaining a federally insured and regulated mortgage. Federally insured and regulated mortgage lenders are required to make homebuyers purchase flood insurance if the building is located in a mapped flood hazard area. Buyers are supposed to be notified well in advance of closing.
- Applying for permits may lead to a determination that the property or construction site is within a mapped floodplain and therefore subject to the Flood Damage Prevention Ordinance.
- The City's Emergency Management Agency routinely coordinates with local media through emails, telephone calls and facsimile transmissions. EMA can request a "crawl line" on local television stations to alert the public of pending flood conditions.
- Flood warnings reach the public as regional warnings from the National Weather Service.

Comparing Risks

*What's the chance that in the next year, a person whose house is **in** the floodplain will:*

- *Be involved car accident? 3 chances in 100*
- *Be in 100-year flood? 1 chance in 100*
- *Have a car stolen? 1 chance in 300*
- *Be a victim of robbery? 1 chance in 1,000*
- *Have a residential fire? 4 chances in 10,000*

www.floodsafety.com

a project of the Texas Environmental Center

4.4 Overview of Augusta's Natural Hazards History

Numerous federal agencies maintain a variety of records regarding losses associated with natural hazards. Unfortunately, no single source is considered to offer a definitive accounting of all losses. The Federal Emergency Management Agency maintains records on federal expenditures associated with declared major disasters. The U.S. Army Corps of Engineers and the Natural Resources Conservation Service collect data on losses during the course of some of their ongoing projects and studies. Additionally, the National Climatic Data Center of the National Oceanographic & Atmospheric Administration collects and maintains certain data in summary format, indicating injuries, deaths, and costs. The basis of the cost estimates, however, is not identified.

In the absence of definitive data on some of the natural hazards that may occur in Augusta, illustrative examples are useful. Drawing on several sources of data, Table 4-2 provides brief descriptions of particularly significant natural hazard events occurring in the City's recent history.

Data on Presidential Disaster Declarations characterize some natural disasters that have affected the area. In 1965, the federal government began to maintain records of events determined to be significant enough to warrant declaration of a major disaster by the President of the United States. Only two major disasters have been declared in Augusta and are identified in Table 4-2.

Table 4-2
Selected Recent Floods and Declared Disasters.*

Date & Disaster (DR)	Nature of Event
October, 1990 (DR 880)	Flood: Flooding caused by convergence of Tropical Storms Klaus and Marco, causing two days of rain, with amounts as much as 15" measured in places. Estimates of damage exceeded \$150 million.
October, 1990	Flood: Local rainfall exceeded 8.5 inches, producing flooding characterized as the 100-year flood.
August, 1992	Flood: Intense rain caused rapid local flooding of homes and numerous roads, resulting in evacuations in the Hollywood Subdivision.

Table 4-2
Selected Recent Floods and Declared Disasters.*

Date & Disaster (DR)	Nature of Event
August, 1994	Flood: The Weather Bureau reported 4.2 inches in a 24-hour period.
September, 1995	Flood: 3.75 inches of rain, characterized as a 10-year storm, caused flooding, resulting in evacuations of 12 families in the Hollywood Subdivision and traffic accidents along Rocky Creek.
March, 1996	Flood: Thunderstorms in the Augusta area send several streams over their banks and into homes, including the Hollywood Subdivision. The flash flooding also closed several major highways which were under water. Rainfall amounts of 2-4 inches occurred in a six to nine hour period over southern Columbia and northern Richmond counties.
December, 1997	Flood: Flash flooding along several creeks flooded several highways including Richmond Hill Road.
March, 1998	Flood: Rae's Creek flooded low lying areas and approached some homes but no flooding in homes was reported.
March, 1998 (DR 1209)	Flood and Winter Storm: More than 3-inches of rain fell on saturated ground, resulting in approximately 10-year flooding; residential and road flooding in the Rocky Creek area.
September, 1998	Flood: EPD reported 8.5 inches of rain from Tropical Storm Earl over a 14-hour period caused flash flooding along several streams. About 50 people were evacuated from two subdivisions, several streets were closed, and one shelter was opened to house 82 people.
June, 2000	Flood: After a prolonged dry period, more than 3 to 5 inches of rain fell over the area, flooding I-20 and other streets, forcing sewage backups; and inundating many homes along Rocky Creek, Rae's Creek and Crane Creek.
May, 2002	Flood: The Augusta Emergency Operations Center reported several streams flooding with water covering roadways and stranding cars. Water was 3 to 4 feet deep in some areas.

* Sources: NCDC Online (1950-2003; some data gaps and few descriptions); NWS Local Climatological Data; City's 1998 Mitigation Plan; FEMA records

4.5 Losses Due to Major Disasters

No definitive record exists of all losses – public and private – due to disasters for Augusta/Richmond County. For the United States as a whole, estimates of the total public and private costs of natural hazards range from \$2 billion to over \$6 billion per year. Most of those costs can only be estimated. In most declared major disasters, the federal government reimburses 75% of the costs of cleanup and recovery, with the remaining 25% covered by the state and affected local jurisdictions. For events of all magnitudes, states and local jurisdictions are responsible for all or a portion of costs associated with:

-
- Public assistance for debris removal, emergency works, roads and bridges, flood control facilities, public buildings and equipment, public utilities, and parks and recreational facilities;
 - Assistance paid out for individual and family grants, emergency food and shelter, and other assistance to individuals; and
 - Funds set aside to support hazard mitigation grants.

Although detailed records are not available, staff report that the City of Augusta and Richmond County received payments to pay for repair of public infrastructure and public buildings; debris removal and staff overtime. GEMA reports that the City and County received public assistance funds totaling \$3.7 million for the flood disaster in October 1990.

4.6 Hazards Other than Flood

The City of Augusta experiences hazards other than flood hazards, although the severity of other hazards and consequences are significantly less. Other known and possible natural hazards that may affect the City include: high winds and tornadoes; extreme heat; drought; wildfire; winter storm; and seismic/earthquakes.

Man-made or technological hazards that are addressed in other emergency plans include: hazardous materials; radiological incidents; and terrorism.

Part 5

Flood Hazards in Augusta

5.1 Flood Hazards: Overview

Floods have been and continue to be the most frequent, destructive, and costly natural hazard facing the State of Georgia. Most of the State's damage reported for major disasters is associated with floods.

Since 1990, Augusta has been impacted by significant flood events, although not all qualified for major disaster declarations. Localized flooding causes concern among citizens because it affects homes, yards and streets.

The City's floodplain maps have been prepared by FEMA in a basic digital format known as "FEMA Q3 Flood Data." Using the City's Geographic Information System (GIS) and available data layers and databases, the City has the ability to develop specific information about flood-prone buildings. GIS is a computer software application that relates physical features on the ground in mapping applications and analyses. The Augusta Information Technology Department manages the GIS functions.

5.1.1 Defining Flood Hazards

When rainfall runoff collects in rivers, creeks, and streams and exceeds the capacity of channels, floodwaters overflow onto adjacent lands. Floods result from rain events, whether short and intense or long and gentle. In recent years, most flooding in Augusta has been associated with large regional storms, some that originate as hurricanes and tropical storms that subsequently move inland. Flood hazards are categorized as follows:

- **Flash floods** not only occur suddenly, but also involve forceful flows that can destroy buildings and bridges, uproot trees, and scour out new channels. Most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or heavy rains from hurricanes and tropical storms. Although flash flooding occurs often along mountain streams, it is also common in urban areas, where much of the ground is covered by impervious surfaces and drainageways are designed for smaller flows. Flood Insurance Rate Maps typically show the 1%-annual-chance (100-year) floodplain for waterways with at least 1 square mile of drainage area. The flood

hazard area for waterways with less than one square mile of drainage area typically are not shown.

- **Riverine floods** are a function of precipitation levels and water runoff volumes, and occur when water rises out of the banks of the waterway. Flooding along waterways that drain larger watersheds often can be predicted in advance, especially where it takes 24 hours or more for the flood crest (maximum depth of flooding) to pass. In Augusta, riverine flooding is caused by large rainfall systems and thunderstorm activity associated with seasonal cold fronts. These systems can take as long as a day to pass, giving ample opportunity for large amounts of rain to fall over large areas. The Flood Insurance Rate Maps show the 1%-annual-chance floodplains.
- **Urban drainage flooding** occurs where development has altered hydrology through changes in the ground surface and modification of natural drainageways. Urbanization increases the magnitude and frequency of floods by increasing impervious surfaces, increasing the speed of drainage collection, reducing the carrying capacity of the land, and, occasionally, overwhelming sewer systems. Localized urban flooding is not usually shown on the Flood Insurance Rate Maps in areas with less than one square mile of contributing drainage area.

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA offer the best overview of flood risks. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. The City's revised Flood Insurance Study (FIS), dated March 23, 1999, is a combination of FIS and maps prepared separately for the City of Augusta and Richmond County prior to consolidation of governments in 1996.

Map 5-1* shows the extent of mapped Special Flood Hazard Areas (i.e., the 100-year floodplain) in the City of Augusta. At 58.77 square miles, the SFHA makes up 24.8% of the City's total land area of 239.89 square miles. Much of the land predicted to flood is on the east side of the City and includes the extensive wetlands of the Phiziny Swamp. FEMA's maps for the City of Augusta show four types of flood zones:

- **AE Zones** along rivers and streams for which detailed engineering methods were used to determine Base Flood Elevations. AE Zones (or

* Maps included in this Plan are available for viewing at the Augusta-Richmond County Planning Commission. The scale required for hardcopy maps does not allow sufficient detail to show all of the elements described in this section.

A1-30 Zones) are shaded in gray. Waterways that are mapped using detailed methods that result in designated floodways are listed in Table 5-1.

- **A Zones** are "approximate" flood zones, where detailed information has not been developed. Waterways that are shown with A Zones are listed in Table 5-1.
- **B Zones and Shaded X Zones**, which are areas of "moderate" flood hazard, typically associated with the 500-year flood (or 0.2% annual chance).
- **C Zones and Unshaded X Zones** are areas of "minimal" flood hazard, typically considered to be "out of the floodplain." Although local drainage problems and ponding may still occur, these minor flood problems typically are not shown on the FIRM. It is notable that many smaller streams are shown but do not have mapped flood hazard areas.

Table 5-1
Waterways on Augusta's FIRM.

Detailed Methods	Approximate Methods
Savannah River	Little Spirit Creek
Butler Creek and Tribs No. 1, 2	Rock Creek
Rocky Creek and Tribs No. 1-11	Augusta Canal
Beaver Dam Ditch	McBean Creek
Spirit Creek and Trib No. 1	-
No Name Creek	-
Oates Creek and Trib No. 1	-
Horsepen Branch	-
Cranes Creek	-
Rae's Creek and Tribs. 1-3	-

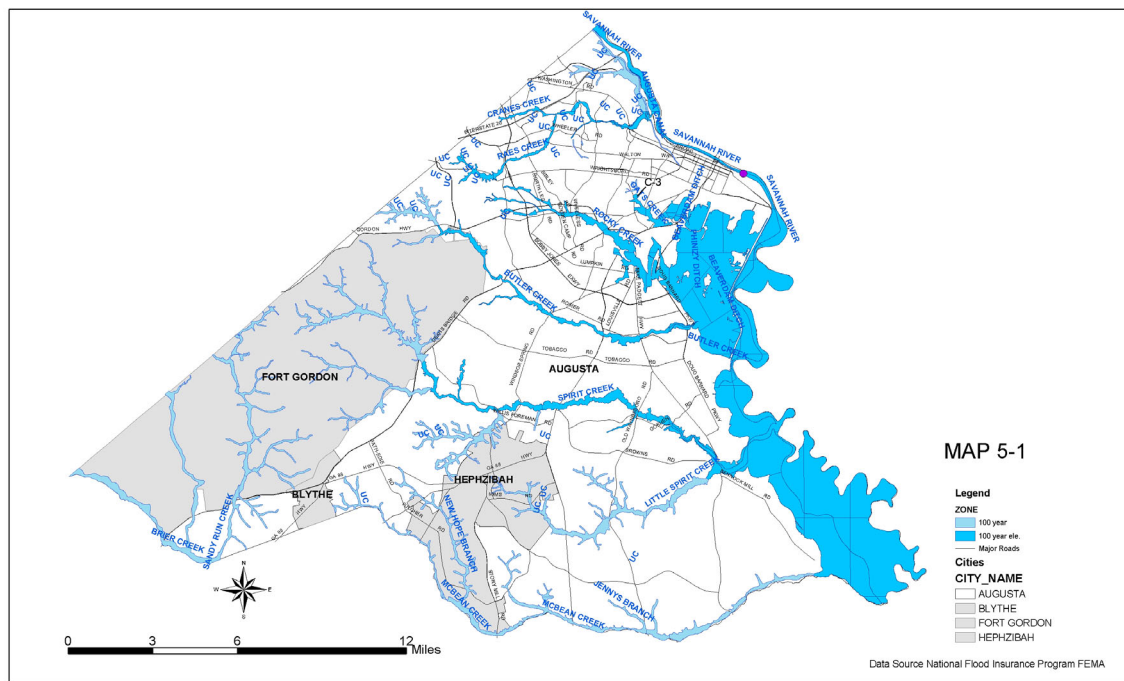
5.1.2 Savannah River

Discharges on the Savannah River are controlled by three flood control dams that create the J. Strom Thurmond (Clarks Hill) Reservoir, the Hartwell Reservoir, and the Richard B. Russell Reservoir. The urban center of the City of Augusta is protected from Savannah River flooding by the Augusta Levee, described in Section 7.2. Development on the river side of the Levee remains exposed to flood hazards, especially

extreme flooding that occurs less frequently than the 1%-annual chance flood (100-year flood). The 1999 revision of the FEMA flood map lowered the predicted water elevations for the 100-year flood:

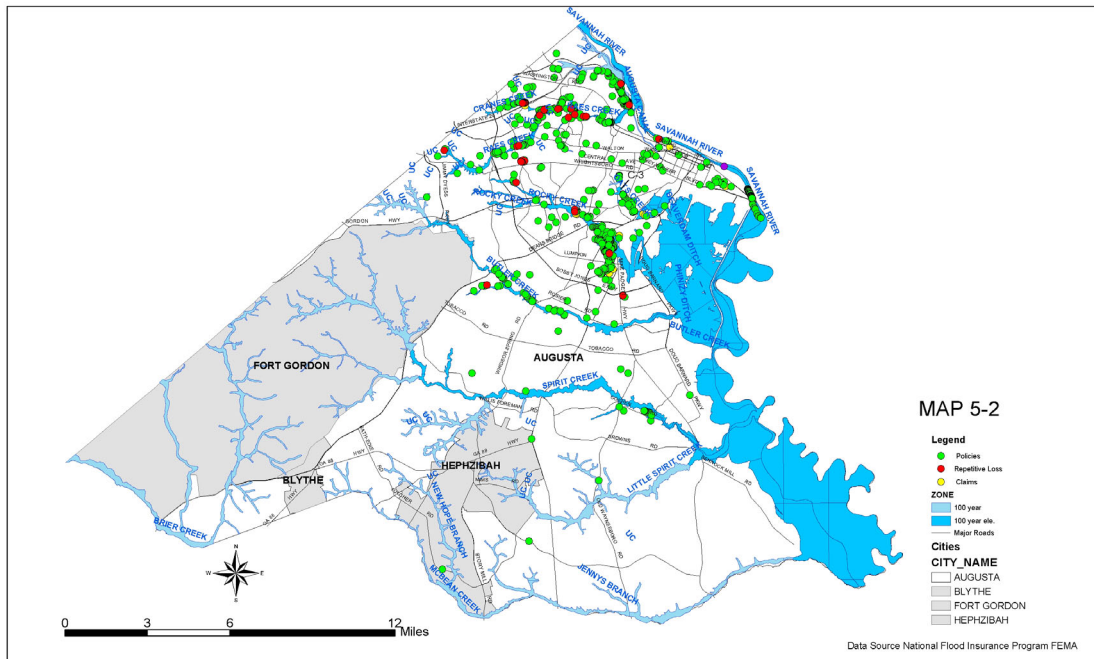
- Approximately 50 houses in the Water's Edge community (upstream of 13th Street) all appear to be out of the 100-year floodplain, although the water level predicted for the 500-year flood is likely to be under the buildings.
- For the most part, the buildings on Prep Phillips/Riverfront Drive appear to be subject to water depths ranging from 3 feet to 4 feet above the ground due to the 100-year flood. Property owners include the City, the Augusta-Richmond County Port Authority, and the Georgia Department of Transportation/Ports Authority. One or two privately-owned buildings appear to be located on City-owned property.
- The 48+ townhouses on Riverfront Drive and River Bend Drive (Goodale Landing, just east of Sand Bar Ferry Road) are all within the 100-year floodplain and the sites appear to be subject to several feet of flooding.
- The vacant lots and improved lots with 12+ homes on Albeclaus (8 are in the Floodway) appear to be subject to from 2-feet to 7-feet of water.
- On both sides of Sand Bar Ferry Road there are several clusters of buildings that appear to be in areas where flood depths are likely to be 2- to 6-feet deep.
- Below the downstream limit of the Augusta Levee, at the confluence of Butler Creek at New Savannah Bluff, the floodplain of the Savannah River is extensive, ranging from 5,000 to 10,000 feet wide. For the most part, there is little development in this area and there are no NFIP flood insurance policies in-force (see Map 5-2).

Map 5-1: *Remove this page and insert 11x17*



Back of Map 5-1: remove this page when Map 5-1 is inserted.

Map 5-2: Remove this page and insert 11x17



Back of Map 5-2: Remove this page when Map 5-2 is inserted.

5.1.3 Urban Watersheds

The urban district of the City, including Butler Creek and northward, encompasses the former City and surrounding areas. Much of the area is densely developed, with the notable exception of the Phinizy Swamp on the eastern side. As shown on Map 5-2, most of the City's flood insurance policies are for buildings in the urban watersheds, with most of them constructed before the City began to regulate flood hazard areas.

Table 5-1 lists the urban waterways, all of which have been studied using detailed methods (Rock Creek, upper reaches of other streams, and small tributaries were evaluated using approximate methods). As part of a study underway by the U.S. Army Corps of Engineers (see Section 7.4.1), the FIRMs may be revised; preliminary results indicate that the areas subject to flooding will increase in many places. Generally, the floodplains of these streams can be described as follows:

- Rock Creek – 200-400 feet wide (restudied by the Corps of Engineers);
- Rae's Creek – 200-500 feet wide (restudied by the Corps of Engineers; see Section 7.3.2 for City's project);
- Cranes Creek, a major tributary to Rae's Creek – 100-300 feet wide;
- Oates Creek – highly modified (see Section 7.3.3), 100-500 feet wide, with a number of ponding areas;
- Upper and Lower Rocky Creek – 100-200 feet wide and 500-2,000 feet wide, respectively (restudied by the Corps of Engineers); and
- Butler Creek – 500-700 feet wide.

The Augusta Canal is a source of the City's potable water. It also is the "collector" into which the other urban streams drain (except Butler Creek). From the Columbia County boundary, the Canal and its floodplain follow the Augusta Levee. At its juncture with Rae's Creek, a gate allows flows to discharge to the Savannah River (the mechanical gate is closed if high water is predicted on the River). The Canal is included in waterways that are being restudied by the Corps of Engineers; preliminary maps indicate that areas prone to flooding are more extensive than shown on the FIRM.

The extensive flood-prone areas are found on Augusta's east side are associated with Butler Creek, Rocky Creek, and drainage from all streams in the urban district (former City). The area, also known as Phinizy Swamp, is generally flat and is predicted to experience relatively shallow flooding. There are few buildings that encroach into the floodplain, although a number of industries have built on fill and there are a number of active clay mining sites.

The Rocky Creek watershed was the focus on research conducted by the Public Works and Engineering Department in 1998, as supporting documentation for mitigation grant funds (see Section 7.3.1). Based on newspaper accounts, local climatological reports, and personal interviews, the estimates in Table 5-2 were developed. It is notable that the U.S. Army Corps of Engineers has independently developed a preliminary estimate (see Section 7.4.1) of average annual damages in Rocky Creek of \$1,450,000 (not including industrial).

Table 5-2
Estimates of Damage Potential: Rocky Creek
(1998)*.

Flood Magnitude	Estimated Number of Affected Structures	Estimated Damages
5-year	±20 residential	\$ 286,000
10-year	±25 residential	\$ 357,500
50-year	±168 residential	\$2,402,00
	±10 commercial	\$1,484,000
100-year	±200 residential	\$2,860,000
	±20 commercial	\$3,2566.50

* Augusta EMA letter to GEMA, June 29, 1998.

5.1.4 Rural Watersheds

The southern half of the City, below Butler Creek, is rural in character with dispersed development. As shown on Map 5-2, few flood insurance policies are in-force in this area, primarily because floodplains are relatively narrow and easily avoided.

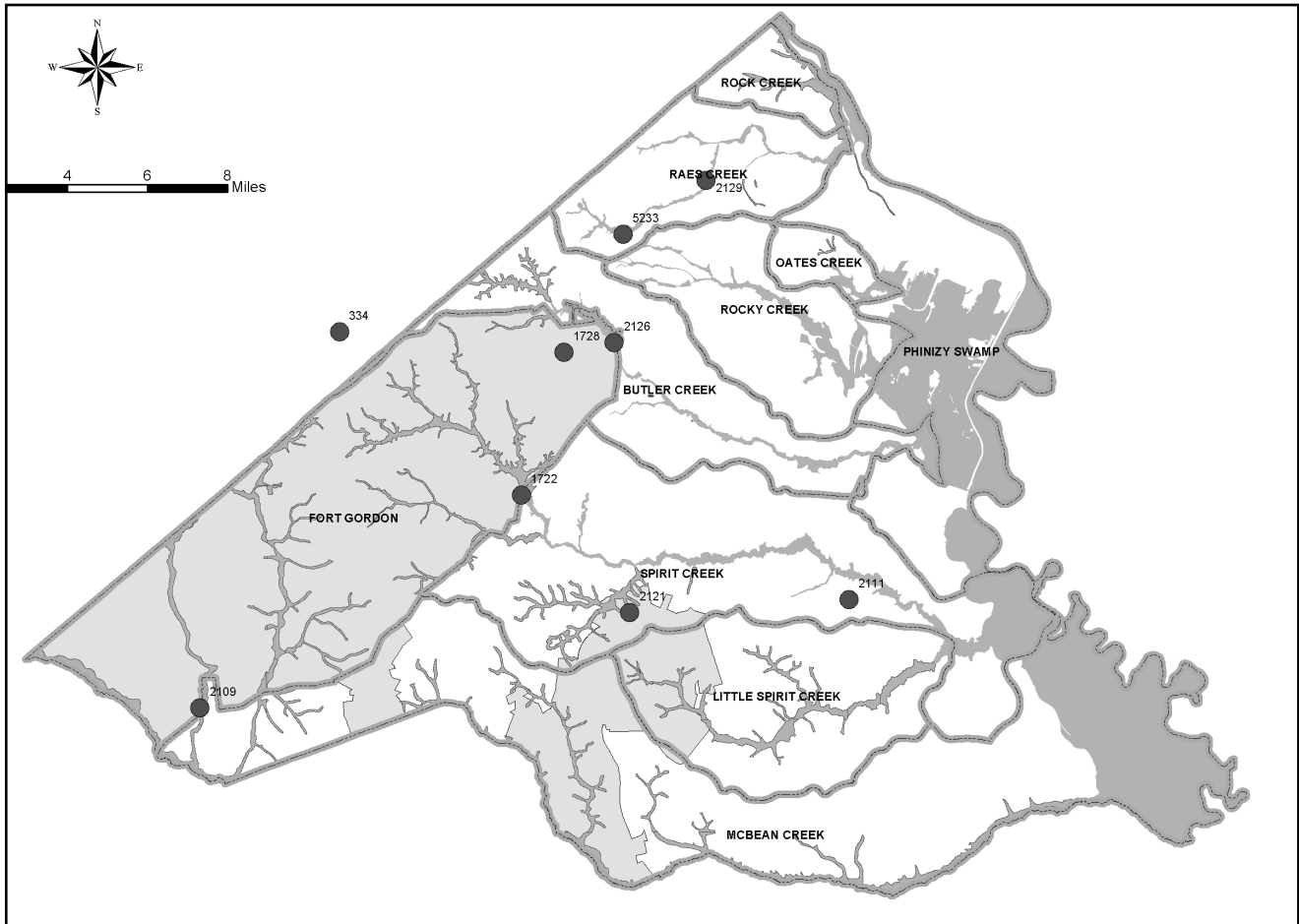
Most of the streams shown on the Flood Insurance Rate Map have been evaluated using approximate methods to delineate the flood hazard area, including: Little Spirit Creek, McBean Creek along the southern border, tributaries to Spirit Creek, and various other streams. The extent of flood hazard areas is limited (watershed boundaries are shown on Figure 5-1):

- Upper Spirit Creek and Johnson Branch – 200-400 feet wide;
- Lower Spirit Creek – 600-800 feet wide;
- Little Spirit Creek and Boggy Branch – 200-600 feet wide;
- McBean Creek – 500-1,000 feet wide;
- Tributaries to McBean – 100-300 feet wide; and
- Many small streams and tributaries do not have mapped floodplains.

5.1.5 Dams and Flooding

FEMA and the U.S. Army Corps of Engineers maintain the National Inventory of Dams (1998), a database of high and significant hazard dams. For the most part, data is provided by state agencies responsible for regulation and inspection of dams or by the Corps of Engineers. Map 5-3 is based on that inventory and shows that 7 high hazard dams (and 3 significant hazard dams) are located in Augusta and one high hazard dam is located outside the City in the upper portion of Spirit Creek. High hazard dams are those that of specific height or volume of impounded water that, if failure occurred, that would be a high likelihood of loss of life and substantial property damage. Table 5-3 lists information on the high hazard dams. There is no requirement for owners to develop emergency action or maintenance plans, although high hazard dams are required to be brought up to state specifications to protect public safety and property.

The Augusta Emergency Management Agency reports that the only high hazard dams for which response plans are on-file are the U.S. Army Corps of Engineers dams on the Savannah River. The Corps's Savannah District operates the dams, monitors flood conditions, and notifies EMA if flooding is predicted. A Levee Closing plan is on-file (see Section 7.2).



Map 5-3
High Hazard Dams (and watersheds). Source: National Inventory of
Dams (1998)

Table 5-3
High Hazard Dams Affecting Augusta.

Dam Name Owner	NID # Waterway	Year Built Primary Purpose	Emergency Action Plan
Erin's Place Lake Dam (Helen Huffman Lake) Elijah Lightfoot, Jr.	224 Spirit Creek	1965 Recreation	Not required
Gordon Lake Dam Fort Gordon (DOD)	1722 Spirit Creek	1986 Recreation	Not listed
Goshen Lake Dam Goshen Plantation Country Club	2111 Spirit Creek	1950 Recreation	Not required
Carroll's Lake Dam Carroll	2121 Spirit Creek	1969 Recreation	Not required
Lake Aumond Dam Augusta-Richmond County	2129 Rae's Creek	(not listed) Recreation	Not required
Richmond Vo-Tech Detention Augusta-Richmond County	4940 Not listed	1979 Recreation	Not required
Wrightsboro Rd Detention Augusta-Richmond County	5233 Rae's Creek	1992 Flood Control	Not required

5.2 Flood Risks – Buildings

The City's Information Technology Department coordinates and maintains the Geographic Information System (GIS). The system allows City staff in many departments to access numerous digital map products and electronic data files. Among the data and maps is a digital map of the floodplain prepared as an overlay for the property parcel maps (derived from the Flood Insurance Rate Maps). Other GIS layers include City boundaries, waterways and watershed boundaries, and ground contours and building footprints from aerial photography data acquired in 2002, parcel boundaries, and National Wetlands Inventory data, from which a wide variety of maps and analyses can be prepared.

There are a number of ways to characterize buildings and potential development that is subject to flooding:

- Using GIS to compare the flood map with the locations of buildings yields an estimate that 3,755 buildings (greater than 400 square feet in

footprint) are located “in” the City’s mapped floodplains. It is important to recognize that this number underestimates the total number of flood-prone buildings, as evidenced by recent flood damage and the fact that nearly half of the buildings with flood insurance policies are shown to be “out” of the mapped flood hazard area

- U.S. Census data are used to develop a median value for residential buildings (\$76,800), yielding estimates of the total value of buildings that plot within the mapped floodplain (Table 5-4). It is notable that there are several clusters of non-residential buildings; those higher-values are not reflected in Table 5-4. Use of the median value to characterize risk is not intended to imply that every flood-prone building is likely to be a “total loss” due to flooding. At this time database limitations do not allow identification of vacant parcels in floodplain, which would represent development potential.
- The addresses of buildings that have flood insurance policies and for which flood claims have been filed, shown on Map 5-2, can be used to identify buildings in mapped floodplains (where lenders require insurance) and where flooding has occurred (where owners are sufficiently concerned that they purchase flood insurance even if not required). This characterization of flood risk is described in the following text.

Table 5-4
Floodplain Buildings, by Commission District

Commission District	Buildings “in” the Floodplain*	Estimate Value** (millions)
District 1	381	\$29.26
District 2	1,646	\$126.41
District 3	283	\$21.96
District 4	28	\$2.15
District 5	178	\$13.67
District 6	44	\$3.38
District 7	735	\$56.45
District 8	460	\$35.33
Total	3,755	\$288.61

*Excludes buildings known to be flood-prone, but outside the mapped floodplain.

**Assumes all residential; based on City-wide median value of \$76,800

NFIP Policies In-Force. Data provided by FEMA’s National Flood Insurance Program in mid-2003 indicate that federal flood insurance policies were in-force on 913 buildings in Augusta. This represents a total face value of insurable property of \$1.05 billion. The locations of buildings with flood insurance are shown on Map 5-2. The majority of insured buildings are located in Commission District 2 and District 7.

It is notable that nearly half of the insured buildings geocode as being “out” of the floodplain. For the most part, two factors prompt people to purchase flood insurance: when mortgage lenders require it, and when actual flood damage makes it clear that a building is, indeed, located in a flood-prone area. Thus, the number and distribution of flood insurance policies is one way to characterize potential risk throughout the City. This is an indication of two important conclusions:

- That many homeowners outside the mapped floodplain are aware of the flooding risks throughout the area and have chosen to carry flood insurance even though it is not required by mortgage lenders.
- Augusta’s Flood Insurance Rate Maps do not reasonably reflect areas that experience frequent flooding; this conclusion in part supports the City’s expectation that revision of its FIS and FIRMs is a high priority with the State and FEMA Region IV.

Summary of Floodplain Buildings & Insurance

- *3,755 buildings are “in” Augusta’s mapped flood hazard areas*
- *About 500 of them (only 13%) have flood insurance.*
- *Nearly 450 buildings have flood insurance but are not “in” the mapped flood hazard area.*

As shown on Map 5-2, there are a number of clusters of NFIP policies and claims, and a number of areas without data points. A review of this map yields the following observations:

- The majority of policies are in the urban district (former City), especially along Rae’s Creek and Rocky Creek.

-
- Several clusters outside of the mapped floodplain warrant consideration, especially north of Laney Walker Boulevard (east of Gordon Highway) and south of the Augusta Canal (along Walton Way).

NFIP Claims Paid. Data provided by FEMA indicate that nearly 200 claims were paid between the end of 1978 and December 31, 2002. Just over half appear to have been paid for claims on properties that geocode as being “out” of the mapped floodplain. It appears that the majority of these claims were for residential properties. The locations of properties that received claim payments are shown Map 5-2. Total amount of claims paid for building and contents payments exceeds \$2.5 million.

NFIP Repetitive Loss Properties. Map 5-2 also shows the locations of “repetitive loss properties” in Augusta. In recent years, FEMA has focused considerable attention on this subset of insured buildings. These properties have received two or more claim payments of at least \$1,000 over a ten-year period. FEMA’s database identifies 48 properties as “repetitive loss properties.” As with policies and claims, a large number of these properties geocode as being “out” of the mapped floodplain.

The claims amounts attributed to these properties were not disclosed, therefore no conclusions can be drawn regarding whether specific mitigation measures would be effective. For example, a property that has received a number of claim payments not much higher than \$1,000 would be considered an unlikely candidate for mitigation using public funds. It may, however, be an excellent candidate for damage-reduction actions taken by the owner.

Manufactured Housing. Manufactured housing units are known to be highly vulnerable to flood damage. The same amount of water inside a site-built home causes considerably less damage (as a percent of total value of the home). One cluster of manufactured homes and three manufactured housing parks are affected by mapped flood hazards and some damage has been reported in the local press:

- Some units along Kissingbower Road and Haynie Drive, north of Cherokee Plaza, are in the floodplain fringe of Rocky Creek.

-
- Durand Trailer Court, south of Gordon Highway on Wylds Road just below the confluence with Tributary No. 7, was affected in June 2000. The City's GIS maps indicate that one parcel of the property is marginally affected, but another parcel has perhaps 10 units shown within the mapped floodplain.
 - Gaskins Trailer Park, north of Gordon Highway on private roads (between Sibley Road and Wheelless Road) was flooded by Tributary No. 6 in June 2000. A newspaper account indicated that some units were shifted off their foundations. Because the FEMA mapped floodplain area was artificially terminated in this area, only 6-8 units are in the mapped floodplain. However, it is apparent that many other units are similarly flood-prone.
 - Gibbs Park, south of Wrightsboro Road near Maddox Drive, has a portion of the site within the floodplain of Rae's Creek, but the units are shown as out.

Historic Resources. The Historic Preservation Commission, assisted by staff of the Augusta-Richmond County Planning Commission, evaluates activities that impact historic properties. There are no known reports of flood damage sustained by designated historic properties. The U.S. Army Corps of Engineers, as part of its flood reduction study (see Section 7.4.1), identified a small number of flood-prone historic structures in selected watersheds (other watersheds not examined):

- **Augusta Canal.** In addition to the Canal itself, 13 National Register individually listed buildings, 3 historic districts, and 12 archaeological sites have been identified. The extent to which specific buildings are at-risk has not been determined.
- **Rae's Creek.** Fruitlands (Augusta National Golf Club) is the only listed property affected; 7 archeological sites have been identified.
- **Rocky Creek.** No nationally listed properties are affected by flooding; 7 archaeological sites may be in the floodplain, primarily where the creek merges with Phinizy Swamp.
- **Phinizy Swamp.** No nationally listed properties, but there is a recognized high potential for prehistoric and archeological resources in flood-prone areas.

5.3 Flood Risks – Public Properties

The City of Augusta and the Richmond County Board of Education together own 137 buildings and structures, and the City owns over 500 individual parcels of land in various locations throughout the City. City

facilities and public schools that are identified below as being located in the mapped flood hazard area are shown on Map 5-4 with letter/number annotations (additional information and photographs of selected buildings along the Savannah River is in Appendix C). Given the low degree of exposure, there is little potential for damage at any public building.

Several City-owned buildings are located on the riverside of the Levee. Using only the digital topography available in the GIS and the Base Flood Elevation (100-year), predicted flood depths at these buildings ranges from 3.5-feet to as much as 8-feet. While most of the buildings would be unlikely to sustain major damage at that depth, the actual damage may be more related to velocity (which is not approximated). Contents damage may be more significant in terms of financial impacts on the occupants. Some City-owned buildings are occupied by private entities.

The Mitigation Planning Committee requested that appropriate offices determine if any facilities were in the mapped floodplain (most City offices have access to the Geographic Information System which includes a floodplain layer). This exercise not only identifies vulnerable facilities, but ensures that facility managers are aware that specific buildings are not flood-prone. Although not part of City government structure, the Richmond County Board of Education and all telephone, electric and gas utility providers were included in the request:

- The Board of Education reported no public schools in the floodplain; one building has experienced drainage problems.
- Georgia Power Company reported that no buildings or electric substations are in the floodplain (other utilities did not respond).

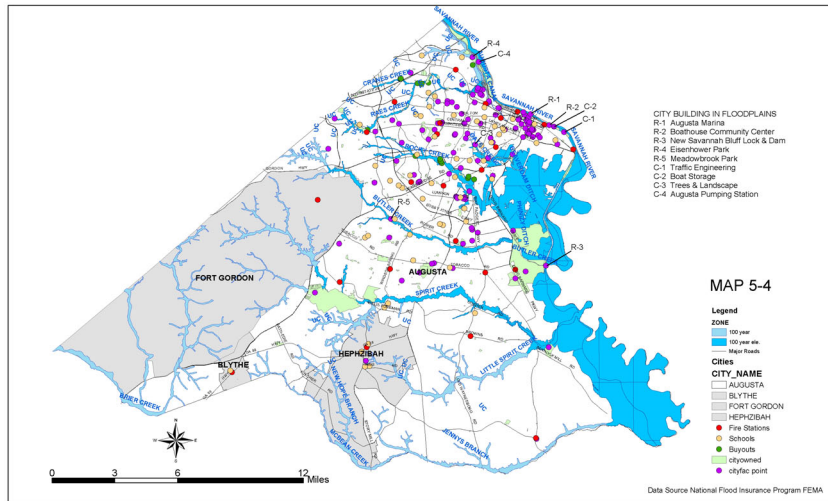
City Buildings. City buildings and facilities have sustained limited damage due to flooding in the past and, for the most part, are unlikely to experience significant future damage. The following statements of potential flooding are based on the Flood Insurance Rate Maps and ground elevations interpolated from the City's topographic maps:

- The Traffic Engineering building, located on the river side of the Augusta Levee, may have 3-5 feet of water during the 100-year flood.
- The Boat Storage building on Prep Phillips may have 3-5 feet of water during the 100-year flood.

-
- The Augusta Marina Store, also located on the river side of the Augusta Levee, may have 4-5 feet of water during the 100-year flood.

-

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Recreation & Parks Facilities. The Augusta Recreation and Parks Department is responsible for numerous facilities throughout the City, shown on Map 5-4 including: 7 community centers, 15 neighborhood parks, a soccer complex, skate park, BMX track, tennis center, and the municipal golf course. The Department coordinates many programs, including: community athletics, aquatics, boating and fishing, after school, and summer day camps.

The Department uses many factors when selecting sites for new park facilities, primarily population and demand. The presence of mapped floodplain is a factor in site selection, although acceptable if there is sufficient land for the facility. The Diamond Lakes Regional Park, built in 1997, includes wetlands and floodplain areas. The site plan required avoidance of the floodplain and all improvements are on high ground.

With respect to floodplains and flood hazards, the Department reports the following:

- New Savannah Bluff Lock & Dam Park is owned by the Corps of Engineers and leased to the City. The City is responsible for buildings, including maintenance and repair. The entire 50-acre site is flat and has flooded 5-6 times since the initial lease. Damage to grounds includes erosion and debris; costs incurred to clear debris and for stabilization. Due to topography, that is no land outside the flood-prone area. The wood playground equipment was damaged and removed; the replacement equipment will use flood-resistant materials.
- City parkland on Lake Olmstead is flood-prone although the buildings are on high ground. Damage due to the flood in 1990 included picnic tables and trails. The Master Plan proposes new playground equipment in the floodplain that will be flood-resistant materials.
- Julian Smith pavilion, located above the Lake Olmstead floodplain, sustained water damage in 1999; the 2000 flood caused less damage due to the way the water was managed.
- The Boathouse Community Center is on the bank of the Savannah River. Because the main level of the building is elevated, it is not expected to be flooded during the 100-year event. However, the lower level is more susceptible; it is used for boat storage and a portion is finished space overlooking the river.
- Other parklands are located in flood-prone areas, but have not experienced flood-related damage.

5.4 Flood Risks – Utilities

Augusta Utilities is responsible for the City's potable water and wastewater treatment services. The department provides project management, construction inspection and land acquisition services for water and wastewater projects associated with commercial developments, some subdivisions, Georgia DOT projects, and the City's Capital Improvement Program. To facilitate its workload, the department is establishing a computerized maintenance management and work order system for both the wastewater collection system and the water distribution system.

Potable Water Service. The Utility provides potable water to 67,500 customers (including 6,000 commercial/industrial users). The system includes 1,100 miles of water distribution lines. The Raw Water Pumping Station withdraws water from the Savannah River to provide 75% of the City's potable water. The remaining capacity is provided by the Highland Avenue Surface Water Treatment Plant and three groundwater treatment plants. The City is phasing out groundwater withdrawal due to available surface water capacity (groundwater sources will be maintained for drought contingency). The New Tobacco Road Surface Water Treatment Plant is expected to come online sometime after 2005.

Wastewater Service. The Utility provides wastewater collection and treatment services for 40,000 customers. The system includes 650 miles of wastewater collection lines; many more miles of private lines feed the system. Treatment is provided at the Spirit Creek Plant and the J.B. Messerly Plant where constructed wetlands at the Phinizy Swamp Nature Park provide effluent treatment prior to discharge to Butler Creek.

Using the City's GIS, the Augusta Utilities Department compared the physical location of its assets with the floodplain map and determined the following:

- Wastewater treatment plants: the City's two plants, JB Messerly and Spirit Creek, are not within the floodplain.
- Sewage lift stations: the department is acquiring the GPS locations of the City's 24 lift stations. At this time the specific location within

mapped floodplains is undetermined; however there is no record of flood damage or outages associated with flooding.

- Sewer manholes: 1,265 manholes plot within the mapped floodplain, an expected outcome given that many sewer lines follow waterways to take advantage of gravity flow.
- Water wells: of the 24 wells, three are located close to areas delineated as approximate floodplain (along Boggy Branch, a tributary to Little Spirit Creek).
- Water storage tanks: by the nature of their function, water tanks typically are located on high ground; the City's 12 ground level and 13 elevated water tanks are not located within the floodplain.

With respect to flooding and flood impacts, Augusta Utilities reports the following:

- The Department is responsible for operation and maintenance of the control gates for the Augusta Canal and the Augusta Levee (see Section 7.2).
- The preferred construction method for water and sewer lines that run under creeks is jack and bore; there are some aerial crossings mounted on bridges.
- Wastewater treatment flow volumes (and consequently treatment costs) increase during storms and flooding due to infiltration through joints in the collectors and inflow through manholes (Figure 5-1). It is estimated that 70% of the problem is on private property and illegal connections of roof drains. Private property owners are responsible for installing sewer lines from building to the right-of-way.
- Through the waste distribution system backflow prevention program the department enforces current requirements for new construction.
- The department addresses backflow problems by educating the public and by planning installations for residential customers and any non-residential customers that are to install backflow devices.

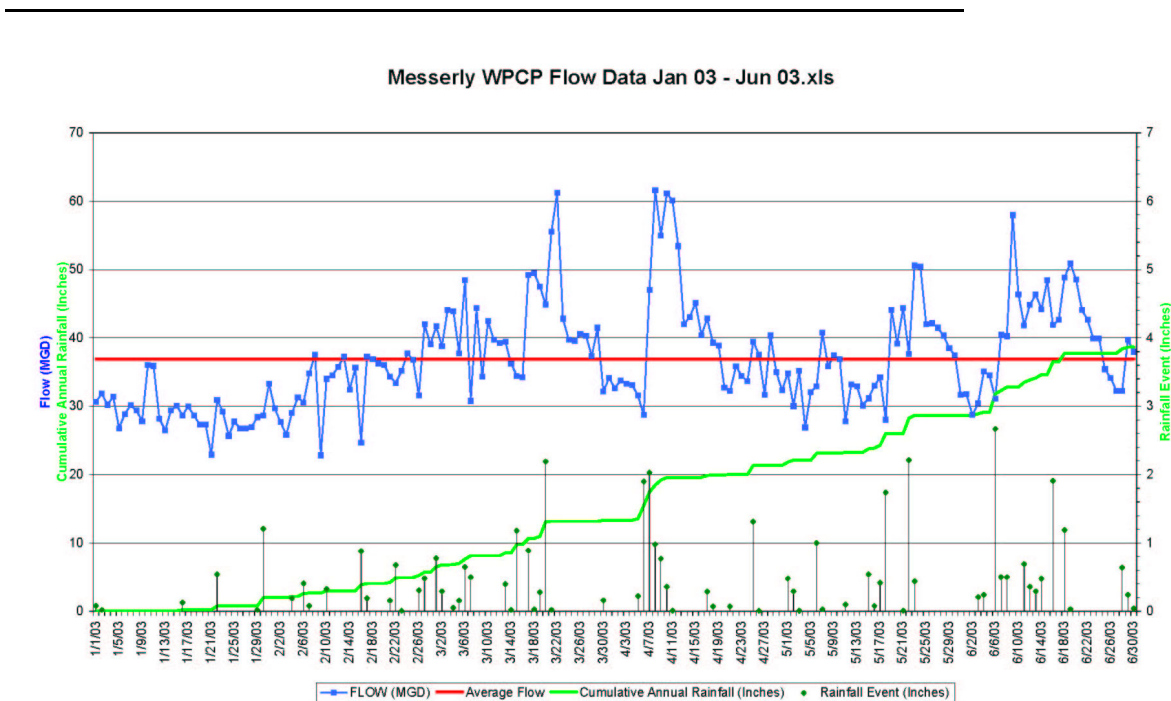


Figure 5-1. Rainfall Affects Treatment Costs.

5.5 Flood Risks – Roads

With respect to roads and flood risks there are two important aspects:

- Nationwide, flooded roads pose the greatest threat to people during floods – most of the more than 200 people who die in floods each year are lost when they try to drive across flooded roads.
- Flood-damaged roads require expenditures of local, state and federal funds for repair and replacement, and traffic flow can be disrupted during the time required to design and construct new crossings.

Based on the roads data contained in Augusta's GIS combined with the floodplain map layer indicates that there is a total of 1,391 miles of road in Augusta: Interstate highways (43 mi), state roads (85 mi), major county roads (196 mi), and other roads (1,067 mi). With 206 miles falling within mapped flood hazard areas, approximately 15% of all roads in the City are subject to some degree of flooding. This statement is not intended to imply that such flood-prone roads are likely to be damaged or pose significant risk to the public.

The City does not have a definitive list of list of flood-prone roads. Table 5-5 was compiled from three sources: press accounts; citizen reports; and the Flood Insurance Study (profile sheets).

The City owns and maintains the majority of road miles within its bounds. Factors that are considered for upgrading roads include safety, traffic loads and capacity. While drainage is rarely a primary factor that prompts an upgrade, drainage improvements often are included in designs. State aid supports some road improvement projects, which may include drainage improvements; this aid is sought on a project-by-project basis.

Various flood events have damaged roads throughout the City, primarily causing erosion. The most significant recent damage includes:

- Willis Foreman Road on Spirit Creek washed out in June 1998;
- One lane of Frontage Road near Bobby Jones Expressway washed out in June 1998;
- Barton Chapel Road at Glen Hills Road, damaged by Rocky Creek in July 1998;

**Table 5-5
Flood-Prone Roads.**

Flood-Prone Roads: Press Accounts		
Peach Orchard Rd	Wheeler Rd	Old Savannah Rd
Gordon Hwy	Boy Scout Rd	East Boundary
Bobby Jones Exwy	Berckmans Rd	Olive Rd
Walker St	Milledgeville Rd	Deans Bridge Rd
Walton Way (ponding)	Wheeless Rd	Meadowbrook Rd
Flood-Prone Roads: Citizen Reports		
Aumond @ Willow Cr	Clark Dr	Rozella Dr
Bobby Jones @ Wheeler Rd	East Boundary	Sheffield Circle
Boy Scout Road	East & West Vineland	Weathers Terrace
Butler Place	Gordon Hwy	Wrightsboro Rd @ I-520
Central Ave @ Daniel	Ingleside Dr	
Chelsea Dr	Milledgeville Rd	

Table 5-5
Flood-Prone Roads.

Flood-Prone Roads: Predicted Flood Depths, in feet (rounded up) from FIS			
Spirit Creek		Oates Creek	
Goshen Rd	1	New Savannah Rd	2
Windsor Spring Rd	2	Boykin St	1
Willis Forman Rd	2	Grant Blvd	1
Birdwell Rd	5	Dyer St	1
Spirit Creek Tributary 1		Milledgeville Rd	1
Willis Forman Rd	2	Rae's Creek	
Cranes Creek		Boy Scout Rd	3
Warren Rd (d/s I-20)	1	Scotts Way	2
Pleasant Home Rd	3	Ramsgate Rd	1
Rocky Creek		Courtside Dr	2
Barton Chapel Rd	4	Jackson Rd	2
Rocky Creek Tributaries		Marks Church Rd	1
Nixon Rd (Trib 2)	1	Wrightsboro Rd	1
Lumpkin Rd (Trib 4)	2	Maddox Rd	1
Kings Grant Dr (Trib 4)	2		
Durham Ct (Trib 4)	2		
Virginia Ave (Trib 5)	1		
Coleman Ave (Trib 5)	1		
Peach Orchard (Trib 5)	1		
Wylde Rd (Trib 7)	2		
North Leg Rd (Trib 7)	1		
Sharon Rd (Trib 7)	2		
Barton Chapel Rd (Trib 8)	1		

When designing new state roads or upgrading existing roads, the Georgia Department of Transportation considers the NFIP's floodplain and floodway requirements to evaluate the impact of new and replacement structures. The Department inspects state bridges for structural integrity and to determine if erosion is a risk, in which case stabilization measures are put into place.

The City considers floodplain and floodway impacts in its planning and design for City roads. Developers must satisfy the City's drainage criteria and other aspects of road designs in order for the City to accept ownership.

When weather conditions suggest that road flooding is likely, the Augusta Emergency Management Agency and other City personnel monitor access routes for that are prone to ponding and flooding and that are critical for fire and emergency medical response requirements, such as Walton Way at 13th and 15th Streets.

5.6 Flood Risks – Local Drainage

Experience shows that many local drainage problems in Augusta are not dramatic or life-threatening, yet contribute to the frequency of flooding, increase maintenance costs, and are perceived to adversely affect the quality of life in some neighborhoods. Many of these areas are not shown on the City's Flood Insurance Rate Maps. One measure of the magnitude of this problem is the evidence that nearly half of flood insurance policies in-force on buildings appear to be outside of the mapped floodplain (Section 5.2).

Many areas and streets experience accumulations of rainfall that are slow to drain away, which may cause disruption of normal traffic, soil erosion, and water quality problems. Drainage problems are associated with deteriorated culverts and undersized culverts (most older culverts were probably sized using "rule of thumb" rather than sized for specific discharge conditions). Areas that have experienced drainage problems include:

- Along Augusta Canal, ponded water has affected City police cars
- Parking areas around the University Hospital experience more than a foot of ponded water.

As part of the Mayor's online State of The City (Feb 3, 2003), Public Works and Engineering was reported to have completed 92% of the work requests filed for mowing, pothole repairs, evictions, vacant lot cleanups, and drainage problems, while at the same time completing important drainage and road construction projects included in the sales tax program.

5.7 Flood Risks – Hazardous Materials

The risk of hazardous materials accidents in Augusta is significant, given the number of industrial users in the area and the number and length of major highways and railroad lines that cross the City. Many people could be exposed to consequences, depending on the location and type of material involved. Hazardous materials are substances that are harmful to the health and safety of people and property.

Extensive flood-prone areas are found on Augusta's east side (see Map 5-1) and are associated with Butler Creek, Rocky Creek, and drainage from all streams in the urban district (former City). The area, also known as Phinizy Swamp, is generally flat and is predicted to experience relatively shallow flooding. Industries in the area are familiar with flood hazards and containment areas (around chemical storage tanks) that are located in floodplain areas are sized to protect against flooding up to the predicted level of the base flood (100-year).

Reports on hazardous materials are prepared by handlers and submitted to and maintained by the Local Emergency Planning Committee (see Section 6.3). As of 2003, the reports do not contain location data in a format that allows use of GIS to determine whether sites are in flood hazard areas. Through the Local Emergency Planning Committee, the Augusta Emergency Management Agency asked handlers about past impacts due to flooding. None were reported.

5.8 Summary: Exposure to Flood Risks

As described in Section 5.3, digital maps of the floodplain are used for flood hazard identification and assessments of risk. The data, combined with the building footprints and other infrastructure asset information, allow estimations of what is “at risk” only by identifying whether such assets are “in” or “out” of the flood hazard area. No other characterization of flood risk can be made, i.e., depth of flooding or whether houses are in the floodway or the flood fringe.

As reported by various City departments and evidenced by plotting the locations of City buildings and facilities, no buildings of critical use and importance are exposed to significant risk of future flood damage.

Part 6 Augusta's Capability to Address Flood Hazards

6.1 The City's Government Structure

In 1996, the City of Augusta and Richmond County consolidated to form one government – Augusta, GA. The consolidated government consists of the Mayor and the Augusta Commission. The Commission is composed of ten members: eight members are elected by district; two members are elected by “super district” (each composed of half the districts). Figure 1-2 illustrates the district boundaries.

The Augusta Commission is authorized by Home Rule Provision of the Constitution of the State of Georgia of 1983 to: establish planning commissions; provide for the preparation and amendment of overall plans for the orderly growth and development of municipalities and counties; provide for the regulation of structures on mapped streets, public building sites, and public open spaces; repeal conflicting laws; and for other purposes.

The City's daily operations are handled by the City Administrator who reports to the Commission and oversees the Operations Portfolio. Two Deputy Administrators oversee the operations in the Public Safety Portfolio and the Administrative Services Portfolio. An Assistant to the City Administrator is the Public Information Officer and communications specialist. The City employs 2,600 people. The departments and offices included in the three portfolios:

- **Administration Portfolio.** Board of Elections; Extension Service; Finance; Human Relations; Human Resources; Information Technology; Law; Library; Purchasing; Tax Assessor; Tax Commissioner
- **Operations Portfolio.** Augusta Regional Airport; Housing & Neighborhood Development; License & Inspection; Planning & Zoning; Public Works & Engineering; Recreation & Parks; Riverwalk; Soil Conservation; Transit; Utilities
- **Public Safety Portfolio.** 911; Animal Control; Fire; RCCI; Civil Magistrate Court; Clerk of Superior Court; Coroner; District Attorney; EMA; Forestry; Jury Clerk; Juvenile Court; Marshal; Probate Court; Sheriff; Solicitor-State Court; State Court; Superior Court

The Augusta-Richmond County Planning Commission, a 12-member appointed body, was created and organized under the Home Rule Provision to "make such careful and comprehensive surveys and studies of existing conditions and probable future developments and to prepare such plans for physical, social and economic growth as will best promote the public health, safety, morals, convenience, prosperity, or the general welfare as well as efficiency and economy in the development of" the City.

The Planning Commission is a recommending body – it makes written recommendation to the Augusta Commission on matters such as rezoning petitions, Zoning Ordinance and Subdivision Regulations amendments, and Final Plat approvals. In particular, the Planning Commission has the power and duty to:

- Prepare a Master Plan (Comprehensive Plan) or parts thereof for the development of Augusta;
- Prepare and recommend for adoption a Zoning Ordinance and map or maps; and
- Prepare and recommend for adoption regulations for the subdivision of land within its political jurisdiction.

The Planning Commission employs a staff of administrative personnel, professional planners, and technical support personnel who are charged with certain planning and development review functions, including:

- Coordinating the City's established process for the review of applications and plans by various City departments and agencies to ensure conformance with all applicable development documents. The process recognizes all types of development: subdivisions; small subdivisions; site developments; and single lot developments.
- Preparing transportation plans, maintaining an information bank, developing the Greenspace program, coordinating activities that impact historic resources, and pursuing grants.

6.2 How the City Plans and Grows

Augusta City department directors and others were interviewed to gain an understanding of awareness of hazards and how they are addressed, and to gather information about damage associated with past hazard events. Notes from the interviews are on file in the Planning Commission and

minutes of committee meetings are in Appendix A. Ordinances, plans, studies, and other documents were reviewed to identify specific provisions pertinent to flood hazards (detailed report on file with the Planning Commission).

6.2.1 Planning for the Future

The City of Augusta uses the comprehensive planning process and land use zoning procedures to set the stage for its future. These documents, prepared according to state requirements and subject to extensive public review, establish policies that guide development and redevelopment.

Comprehensive Plan (Draft July, 2003). Augusta's Comprehensive Plan is a long-range plan for managing and guiding development over a 20-year period. It examines existing conditions affecting development, enumerates the needs and goals for the future, and spells out the strategy for addressing the needs and achieving the goals. The Plan serves as the basis for local decision-making and a general resource for information about the present and future condition of the City.

The three-step process outlined by the State was followed and included: conduct inventory and assessment; develop a statement of needs and goals; and develop an implementation strategy. The City's webpage includes a section explaining the comprehensive planning process and outlining several questions and answers, a summary of the benefits of planning, and a brief statement about what the comprehensive plan does – and what it does not do. Meetings were held with major stakeholders (neighborhood associations, development organizations, realtors, builders, utilities, environmental organizations, the school board, and interested private citizens) and more than 20 public meetings were held throughout the process.

The planning elements addressed are: population; housing; economic development; transportation; community facilities and services; historic resources, natural resources and greenspace; and land use. The Implementation Strategy is outlined, listing goals, needs and strategies for each plan element. The Short Term Work Program identifies specific projects, including estimated cost and responsible entities, to be

undertaken from 2003-2006. Selected goals, objectives and strategies that are pertinent to reducing flood hazards include:

- Promote a land use pattern that accommodates growth and revitalization while protecting established residential areas and natural resources, by accommodating additional residential, commercial and industrial development in the areas designated on the Future Land Use Map.
- Provide public facilities and services that meet the needs of residents and businesses, enhance the quality of life, and protect natural resources, by:
 - Making improvements to roads and bridges that enhance safety, reduce congestion and respond to expected growth patterns.
 - Providing and maintaining recreation and park facilities that meet the needs of residents and visitors, contribute to economic development, and help protect natural resources.
 - Making the Greenspace Plan an integral part of the City's Land Use Plan.
- Protect natural resources and use them as appropriate to provide recreation opportunities, educate the public and increase tourism, by:
 - Preserving and enhancing water quality in the Savannah River and along creeks and tributaries
 - Protecting floodplains and wetlands
 - Reducing soil erosion
 - Reducing non-point source pollution of groundwater and surface water sources
 - Assessing the health of local watersheds and develop procedures to maintain the water quality in the Savannah River and local creeks and tributaries

Comprehensive Zoning Ordinance (revised April 1, 2003). The Comprehensive Zoning Ordinance, consisting of maps and regulations, was originally adopted in 1963 (the former City began to zone in the 1930s). The most recent amendments were approved in April 2003 (adopted by reference at §8-1-1). The Ordinance sets forth the legal uses of land within each of the various districts, which are illustrated on the official Zoning Map. Generally, land uses are categorized as agricultural, residential, professional, commercial, or industrial. Augusta utilizes a "pyramidal" zoning system, where, with some exceptions, land uses permitted in more restrictive zones are also permitted in less restrictive zones.

The purpose of the Comprehensive Zoning Ordinance is to promote health, safety, morals and the general welfare of the people of Augusta. It is intended to guide and accomplish coordinated, adjusted, and harmonious development to meet a variety of goals. Among those goals are drainage, adequate public utilities, recreation, conservation and development of the State's natural resources, and lessening traffic and other hazards to life, limb, and health.

Provisions specific to managing floodplains are included in the following:

- Planned Development Riverfront Zone, along the Savannah River, is recognized as an economic, historic and visual resource that also is of critical and sensitive concern. A wide variety of uses are permitted, including residential uses. The Ordinance provides for the orderly and aesthetic development or redevelopment, including oversight by the Riverfront Development Review Board:
 - Applications for development in the zone must provide for public access to any areas designated as floodplain;
 - The floodway of the Savannah River and access easement must be dedicated to the Augusta Commission; and
 - Buildings and site planning are to comply with the Floodplain Ordinance.
- Savannah River Corridor Protection District, defined as all areas within 100-feet horizontally from the river bank, is to remain in undisturbed vegetative buffer.
- Manufactured Home Regulations, specifically those pertaining to Manufactured Home Parks, specify that no park “shall be so located as to be subjected to hazards of flood, poor soil conditions, poor drainage, or other hazardous conditions.”

6.2.2 Regulating Development (General)

The City of Augusta has developed a set of coordinated documents that pertain to the regulation of land uses and development in order to protect against the potential negative impacts of converting land from its natural state to urban land uses. Negative impacts include poorly constructed streets, water systems and sewers, soil erosion, flooding, and reduction of property value are only a few examples of the health, safety and welfare issues that compel the regulation of development.

Augusta's Development Regulations Guide provides an overview of the various regulatory documents that have been adopted by the City. Along

with an easy-to-read overview, it is made available to the public on the City's web page, along with most of the development documents.

Provisions of development documents that pertain to managing flood hazard areas are summarized below. The Flood Damage Prevention Ordinance and related materials is summarized in Section 6.2.4. Because they related to managing natural resources, three documents are summarized in Section 6.8: Greenspace Program, Tree Ordinance, and Groundwater Recharge Area Protection Ordinance.

Land Subdivision Regulations. The Land Subdivision Regulations (adopted by reference at §8-3-1) regulate the subdivision of land by providing a process for the approval of plats and by providing general infrastructure construction standards. The former City first adopted subdivision rules in the 1950s, while Richmond County's rules dated to 1971. The stated purposes of the current regulations include, among others: to protect natural, economic and scenic resources; to encourage public open spaces; to ensure proper consideration of drainage; to promote a safe and healthy environment and control the spread of blight; and to encourage wise development in harmony with the Comprehensive Plan.

The Planning Commission coordinates the City's subdivision reviews, including coordination with state agencies. The City Engineer inspects and approves certain required improvements before the City accepts easements, improvements, and dedications.

Extensive and detailed specifications for Site Plans and Final Plats are listed and include information necessary to review drainage and floodplain impacts. With respect to managing flood hazards, applicants are required to:

- Show the outline of the 100-year floodplain boundary and notes; a note is required if the property is not affected by the floodplain.
- Note on each lot to identify the minimum finished floor elevation that must be 3-feet above the base flood elevation; this requirement also applies to those lots that are impinged by the floodplain but the building footprint is not within the hazard area.

Site Plan Regulations. These regulations (adopted by reference at §8-8-1) require Site Plan approval for construction or expanding a structure (other than a single family home and certain other exempted activities). The Site Plan is an accurately scaled plan and supporting documentation that illustrates the existing conditions and the details of proposed developments.

Procedures for Site Plan approvals are outlined and the Planning Commission coordinates reviews by all appropriate City offices. The requirements for Site Plans are specified. With respect to managing flood hazards, applicants are required to:

- Define the acreage of all on-site and off-site drainage areas contributing flow through the site.
- Specify the stormwater management plan, including hydrology studies.
- Show the outline of the 100-year floodplain boundary and notes; a note is required if the property is not affected by the floodplain.
- Note on each lot to identify the minimum finished floor elevation that must be 2-feet above the base flood elevation (revision to 3-feet to be consistent with other regulations is expected in 2004); administratively, this requirement is applied to sites that are impinged by the floodplain but the building footprint is not within the hazard area.

Stormwater Management. The Stormwater Management Ordinance (adopted by reference at §5-1-1) is administered by the Public Works & Engineering Department. It provides minimum requirements regarding the design and construction of public/private stormwater management facilities. Provisions outline the acquisition, design, standards and guidelines, operation and maintenance, and inspection of stormwater management facilities. Water quality controls are required of all developments. Facilities are:

- Privately-owned and maintained, if serving single lot developments or commercial/industrial development; or
- City-owned and maintained, if accepted by the City (primarily in subdivisions).

Stormwater Management Plan Technical Manual. Adopted by reference at §5-6-1, the Stormwater Management Plan Technical Manual establishes minimum requirements for the design and construction of individual and collective stormwater management systems. It is written to provide engineers, developers, land planners, and others with the technical information necessary to design and construct stormwater management systems that minimize the increase in volume and intensity of stormwater due to development activity. This is necessary to protect adjacent property owners, public infrastructure, and waterways when land is developed.

A stormwater management plan required for Site Plans (single lot) and subdivision Development Plans. Certain exemptions are allowed in the urban district, where there will be no increase in runoff, if the site is less than 1 acre and the increase in runoff is less than 1 cfs for the 50-year storm. Hydrology/hydraulics reports are required to establish the pre- and post-development rainfall-runoff relationships. The analyses are required to consider the 2-, 5-, 25-, 50-, and 100-year return frequency storms (and use of the 24-hour storm is required if the drainage area is more than 100 acres). Design specifics:

- Storm drains are designed for the 25-year return frequency storm and applicants must evaluate the “overall storm drainage system in the event of a 100-year return frequency storm.”
- Open channels are designed for the 25-year return frequency storm; additional capacity may be required if damage to surrounding properties could occur; erosion protection may be required.
- Culverts are designed for the 25-year return frequency storm; backwater elevations are not to rise higher than 6-inches below the shoulder of the roadway; minimum velocities are specified to minimize sediment build-up.
- Detention basins are generally required and designs must manage post-development runoff at pre-development rates for the 2-, 5-, 25- and 50-year return frequency storms; provision for conveying the 100-year flood flows is required, and detention facilities not allowed in the FEMA-mapped floodplain

Special Basin Restrictions. Due to past damage to property and infrastructure, additional stormwater management facility design considerations are required in: Rae's Creek; Rocky Creek; and Rock Creek basins. The requirements include:

- For sites less than 10 acres, no fill or detention facilities in the floodplain;
- Stormwater management is required for all developments; and
- Release of stormwater associated with the 50-year frequency storm shall be limited to 90% of the pre-developed rates.

Design Rainfall Events

For the Augusta/Richmond County area, the 24-hour design rainfalls (not adjusted annually):

- *100-year rainfall = 8.0"*
- *10-year rainfall = 5.6"*
- *2-year rainfall = 3.75"*

Street and Road Design Technical Manual. The Technical Manual (adopted by reference at §7-3-60) establishes minimum requirements for the design and construction of streets, roads, and appurtenant structures, including drainage, culverts and bridges. It provides engineers, developers, land planners, and others with the technical information necessary to design and construct streets and roads within subdivisions and in some cases within individual commercial or industrial sites. For major works, the Georgia Department of Transportation Standards & Specifications are referenced.

Soil Erosion/Sediment Control Ordinance. The Soil Erosion and Sedimentation Control Ordinance (adopted by reference at §7-3-31) provides minimum guidelines for measures and practices as applied to development, including street and utility installations, drainage facilities and other temporary and permanent improvements. "Land disturbing activities" include clearing, dredging, grading, excavating, transporting, and filling (certain other activities and types of projects are exempt).

Appropriate measures per Best Management Practices are to be installed to prevent or control erosion and sedimentation pollution during all stages of any land-disturbing activity.

Individual sediment and erosion control plans are to be prepared in accordance with the *Manual for Erosion and Sediment Control in Georgia*, prepared by the Georgia Department of Natural Resources. Plan content includes delineation of waterways, drainage, wetlands, and 100-year floodplains. The City is designated as the Issuing Authority, and Soil Conservation provides the technical review of plans.

Grading Ordinance. Adopted by reference at §7-3-40, the Grading Ordinance regulates excavation, filling, and grading activities to address erosion and sediment deposition that causes pollution and damage to domestic, agricultural, recreational, fish and wildlife, and other resource uses. Grading plans and permits are required, except for specifically exempted activities. For site activities involving land disturbances greater than 1.1 acres, the developer must show grading provisions and a separate Grading Permit is required. Plan requirements are specified; designers must show the outline of the 100-year floodplain boundary and notes or a note that the property is not affected by the floodplain.

Utilities Department Design Standards. Sections specify design and construction standards for potable water distribution systems (including fire hydrants and fire lines) and for sanitary sewer system construction. Plan submittals must show, among other requirements, creek crossing details and backflow prevention devices. The requirement for backflow prevention devices is coordinated with the Site Plan Regulations and Subdivision Regulations.

6.2.3 Building Permits and Inspections

The License and Inspections Department administers and enforces codes related to building construction, property maintenance, business licenses and alcohol licenses. The current building code is the International Building Code and the International Residential Code, both adopted by the State under the cover of the Standard Building Code. Although the code contains building-specific provisions for flood resistance that are

consistent with the NFIP, the City relies on the Floodplain Management Ordinance.

In 1998, the City received a Building Code Effectiveness Grading System evaluation by the Insurance Services Organization, Inc. The evaluation examines codes, staffing, training, and inspections, and the results affects property insurance rates. The City received a Class 6 for commercial/industrial construction and a Class 6 for 1- and 2-family residential construction.

The department includes 13 professional staff who perform plans reviews and inspections. All staff meet or exceed State requirements for certification in their trade/specialty, either through the model code organization or the Georgia State Construction Licensing Board and most staff hold multiple certifications. To maintain qualifications, staff attend training offered by the International Code Council (includes SBCCI), Georgia Power, Georgia Natural Gas, the Soil Conservation Service, and commercial providers.

The number of permits issued and inspections conducted in 2001 and 2002 are summarized in Table 6-1. In recent years, very few permits have been issued for buildings located in the mapped flood hazard areas. Processing of such permits includes these steps:

- Standard intake procedures includes a GIS check to identify several factors that are maintained in the related databases, including whether any portion of the property is located in the floodplain, which prompts a requirement that applicants first obtain approval from the Planning Commission. .
- The standard intake procedures apply to applications for work in existing buildings; if determined to be in a floodplain, Planning Commission approval is required before a building permit is processed.
- For all building permits issued in floodplains, the Department reiterates the floodplain elevation requirement and the requirement to submit Elevation Certificates. Builders typically shoot elevations when foundations are finished and the Elevation Certificate must be submitted prior to release of the Certificate of Occupancy.
- If field inspectors see any work for which they do not have a permit file (whether in or out of the floodplain), they investigate the activity using

office and computer resources; citations are issued for working without permits

Table 6-1
Permit & Inspection Activity (2001, 2002).

	Calendar Year 2001	Calendar Year 2002
New single-family, detached	356	460
New single-family, attached	161	100
Multi-family (2 or more)	22	30
Non-residential (all types)	75	68
Residential (additions, alterations, repairs)	1,930	2,261
Non-residential (add's, alt's, repairs)	415	425
Demolition	200	222
Relocation	1	1
Other (mechanical, plumbing, electrical)	6,005	5,891
Mobile home (permanent/temporary)	298	267
All inspections (charged fee)	6,119	6,597

6.2.4 Regulating Flood Hazard Areas

The City of Augusta administers a coordinated set of regulations and ordinances that combine to comprehensively regulate flood hazard areas to minimize exposure of people and property. Section 6.2.2 outlines the pertinent other documents, with specific emphasis on their flood-related provisions.

The Planning Commission coordinates reviews of permits and plan approvals, including individual lot development and single family homes submitted for building permits if the License & Inspection Department determines that the parcels are affected by the mapped floodplain. Table 6-2 reports on the number of floodplain approvals issued in 2001 and 2002. It is notable that the City processes as “floodplain” all applications for parcels that are touched by mapped floodplain areas, even if the proposed development is not “in” the flood hazard area.

Table 6-2
Floodplain Approvals (2000, 2001, 2002, 2003).

	Calendar Year 2000	Calendar Year 2001	Calendar Year 2002	Calendar Year 2003*
Buildings and additions "in" the mapped flood hazard area (includes improvements, repairs, MFH installation)	8	19	27	13
Other activity "in" the mapped flood hazard area (includes pipelines, utility work, grading, signs,	2	8	3	1
Permitted activity "out" of flood hazard area, but on parcel that is affected by mapped flood hazard area	88	8	8	9

* Through July 2003

The purpose of the Flood Damage Prevention Ordinance (adopted by reference at §8-1-1) is to provide regulations for land development and construction in flood prone areas. The Ordinance is accompanied by the Flood Insurance Study and Flood Insurance Rate Maps that delineate areas susceptible to flooding during the 100-year and 500-year design floods. For the most part, the maps are based studies conducted by the U.S. Army Corps of Engineers on behalf of the Federal Emergency Management Agency (FEMA). The maps are the basis for determining which areas are regulated, what development can occur on a specific lot or tract, and what protective or remedial measure should be taken to support development. The Planning Commission administers the Ordinance and the maps are available to the public in its office.

Anyone who proposes to construct a structure, or to grade, fill or develop in a flood-prone area is required to obtain a Flood Development Permit before initiating any work. Applicants are required to disclose existing topography site and proposed structures, grading, drainage facilities, and contours. Depending on the nature of the project, the permit may be obtained as part of a Site Plan, subdivision Development Plan, or as a separate permit. An Elevation Certificate must be filed for each building to document that the lowest floor is no lower then required by the Ordinance before a Certificate of Occupancy is approved by the License and Inspections Department.

The Ordinance is amended periodically to conform to new Federal regulations, to correct deficiencies, and to address new issues. The maps may be revised by FEMA if substantial modification to a drainage basin or a waterway occurs, and site-specific map amendments may be approved by FEMA on the basis of engineering data supplied by a property owner. Variances may be considered by the Board of Zoning Appeals, but are rarely granted due to the criteria outlined in Federal regulations.

A statement of findings of fact that, along with the statement of purpose, sets the framework for the City's regulation of flood hazard areas:

- The flood hazard areas of Augusta, Georgia are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood relief and protection, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.
- These flood losses are caused by the occupancy of flood hazard areas of uses vulnerable to floods, which are inadequately elevated, flood-proofed, or otherwise unprotected from flood damages, and by the cumulative effect of obstructions in floodplains causing increases in flood heights and velocities.

The Flood Damage Prevention Ordinance is largely consistent with the regulations of the National Flood Insurance Program, with several notable exceptions that exceed the minimum federal requirements. Those exceptions, listed below, facilitate the City's objective of guiding development away from flood hazard areas:

- **Floodway Fringe.** Dividing the area that is landward of the floodway, yet within the floodplain, into the "lower floodway fringe" and the "upper floodway fringe" is a unique and effective provision. It allows the City to regulate the areas adjacent to mapped floodways as floodways, recognizing that such areas are artificially delineated on a map without full recognition of the likelihood that floodwaters will be fast flowing and relatively deeper.

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- **Cumulative Substantial Improvement.** The Ordinance specifies that any combination of repairs, reconstruction, alteration, or improvements to a building that take place during a five-year period count towards the 50% of market value trigger for substantial improvement.
 - **Unmapped Flood Hazard Areas.** Areas known to have flooded historically or that are defined by engineering practices but not yet incorporated into the Flood Insurance Study are included in the area regulated.
 - **Freeboard above Base Flood Elevation.** The lowest floors (including basement) of new construction (including manufactured homes) and substantial improvements are required to be elevated no lower than three feet above the base flood elevation shown on the FIRM.
 - **Elevation Certificates.** Procedurally, the City applies the requirement to submit surveyed evidence that the lowest floor is at or above the required elevation on all buildings if any portion of the lot is touched by the mapped flood hazard area.
 - **Large Tracts.** Tracts of land that have more 1 acre that is within the mapped floodplain are regulated as if the floodplain is floodway, effectively providing a land use tool to guide development activities away from low areas.
 - **Equivalent Floodways in A Zones.** For flood hazard areas for which base flood elevations have not been determined (A Zones), the Ordinance, in effect, defines a floodway. As measured from the top of the stream bank, the area that is “equal to five (5) times the width of the stream or twenty (20) feet, whichever is greater” is treated as a floodway.

Flood Hazard Area Development Permit Application Form &

Information. The Augusta-Richmond County Planning Commission has developed a form to summarize the information that is required to be shown on plans. It specifically requires elevations in relation to mean sea level and advises the following information is required:

- Elevation of lowest floor (including basement) of all structures;
- Elevation of the floodproofing measures used for non-residential structures;
- A certificate that floodproofing designs meet the Ordinance requirements; and
- Description of watercourse alterations.

A 5-page information handout (dated July 2000) is provided to applicants for floodplain development. It includes a brief background on flooding in Augusta, flood warning and flood safety, flood insurance, property protection measures, permit requirements, substantial improvement requirements, drainage system maintenance advice, a brief statement regarding the natural and beneficial functions of floodplains, and references for more information on flooding.

Substantial Damage/Improvement Packet (undated). The packet was prepared in 2000 after a flood that caused considerable damage and prompted an awareness of the importance of having materials to provide property owners. It is used by the Flood Assessment Team (see Section 6.7) and includes:

- Notice to property owners to provide the information about the “50% rule” (pertaining to substantial improvement and repair of substantial damage);
- Application for review (so that a determination can be made as to whether a Development Permit and/or a building permit are required);
- Affidavits for the Owner and the Contractor; and
- List of items required and worksheet for estimating the cost of reconstruction/improvements.

6.3 Emergency Management

The City’s Emergency Management Agency is responsible for preparing and coordinating all emergency support functions to prevent, minimize and repair injury and damage resulting from emergencies and disasters, whether natural or man-made. Hazards that are addressed include: structural fire; police/public safety services; medical and health services; rescue; warning services; communications; defense from radiological, chemical and special weapons; and other functions related to civilian protection.

Due to the types and quantities used by local industries and the presence of major transportation routes and railroads, the most significant threat to the citizens of Augusta is exposure to hazardous materials. The Emergency Management Agency coordinates the Local Emergency Planning Committee, which is very active and primarily focused on

“community right to know” regarding hazardous materials and chemical accidents. The committee consists of 24 representatives from the City, community groups, and local industries. It sponsors community meetings, open houses, industry tours, shelter-in-place training, and risk management seminars. Augusta enjoys significant industry-to-industry cooperation, with hazardous materials handlers cooperating on a notification system and citizen education and outreach.

The EMA also coordinates the Community Awareness Emergency Response (CAER) which started in 1984 when Richmond County’s hazardous materials program began. The quarterly meetings focus on communications between citizens and industry and are well-attended.

EMA’s current initiatives include:

- Improving public education and information on all hazards, including flood, hurricanes, tornadoes, heat and hazardous materials. This accomplished through numerous presentations to citizens groups, neighborhood associations, church groups, and tours of the 911 Communications Center. A pending proposal will create a short-term grant-funded position to establish the outreach initiative.
- Developing the “911 Message” system through Calling Post, Inc., a computerized, auto-alert system that can be set up with groups of numbers for specific purposes or specific geographic areas. EMA can tailor messages for each incident or area alerted. The system has the capability to examine call logs to determine if the message was received live, by recording, or not answered.

6.4 Public Works & Engineering

The Department is composed of six divisions: Engineering, Maintenance, Facilities Maintenance, Solid Waste, Trees & Landscapes, and Administration. Funding for public works projects is largely derived from a 1% sales tax that provides for citywide capital projects, including roads, drainage, parks, fire stations, and other public buildings. The Capital Improvement Program is revised every 5 years based on pre-determined priorities and documented needs. At present, the Department represents the City on the Corps of Engineers’ Flood Reduction Study (see Section 7.4.1).

Generally, the department's responsibilities include:

- **Engineering Division** includes four sections (County Engineering, Preconstruction Engineering, Environmental Engineering, and Traffic Engineering). The County Engineering Section reviews proposals for privately developed roads, drainage and stormwater management designs, and is responsible for subdivision plan reviews, subdivision inspection, utility permits and inspection, and erosion control. The Environmental Engineering Section is responsible for National Pollution Discharge Elimination permits, underground storage tanks, environmental permitting; and Brownfields. Preconstruction Engineering manages certain capital projects.
- **Infrastructure Maintenance Division** is responsible for right-of-way maintenance, paving, vacant lot cleanings, community cleanups, drainage maintenance (storm drains, ditches, detention/retention ponds).
- **Solid Waste Division** is an enterprise fund and is responsible for composting, landfill operations, and recycling.
- **Urban Forestry Division** develops programs to enhance sound management and stewardship, provides in-house fire control training, supports fire prevention programs (schools, civic clubs and private organizations), and advises residents on shade trees.
- **Facilities Management Division** is responsible for maintenance of City buildings and construction new of City buildings.

The Department is establishing a database-driven system to maintain a wide variety of records and work orders. Referred to as the “GBA system,” installation will begin in 2003. A component of the system will be designed to centralize recording of citizen complaints regardless of the office that fields a call. The system will facilitate documentation of repetitive complaints, repetitive repairs and document costs. One benefit will be to help prioritize the benefits and costs of drainage improvements or other modifications.

Maintenance of Lake Olmstead and Lake Aumond is among the Department's responsibilities. As funding allows, work includes vegetation maintenance and dredging, although the latter is a very expensive endeavor. Both lakes are “flow through” and do not have operable inlet and outlet structures. Many years ago, flooding washed out

Walton Way at Lake Aumond; the reconstruction was accomplished to function as a dam and emergency spillway.

As identified in agreements with the U.S. Army Corps of Engineers, among the City Engineer's responsibilities is inspection of certain flood control works, including the Augusta Levee and Oates Creek Flood Control Projects. These inspections are conducted with the U.S. Army Corps of Engineers. Modifications to the Oates Creek project will be managed by the Preconstruction Engineering Section.

Inspection and maintenance of the stormwater system, especially drainage ditches and the 250+ detention basins that are in City ownership, are major Public Works responsibilities. The basins are those associated with subdivisions (basins on single lot developments generally stay in private ownership) and those constructed by the City. Maintenance is necessary to ensure proper functioning to provide the appropriate management of runoff. The City's Wrightsboro facility on Rae's Creek was developed to help reduce existing drainage problems.

Flooding has damaged several privately-owned ponds:

- A pond on Horsepen Branch (tributary to Spirit Creek) that was located above Sand Ridge Subdivision failed in May 2003, most likely due to deterioration of the spillway pipe.
- Harrison Sears pond, on Horsepen Branch (tributary to Spirit Creek) has been damaged by high water more than once.
- Located on Spirit Creek above Peach Orchard Road, Richmond Factory Pond failed in 1990 and was rebuilt.
- A stormwater pond at Arbor Place on a tributary to Rock Creek, was damaged by torrential rainfall and contributed to downstream damage.

6.5 Other Departments & Programs

In addition to the City department described in other sections, two other City departments and programs have minor or related responsibilities related to flood hazards.

Housing and Neighborhood Development. The Department's mission is to provide decent housing, suitable living environment and expand

economic opportunities, principally for low and moderate-income persons and neighborhoods. Among its current goals are the following:

- Develop and implement comprehensive neighborhood revitalization strategies for distressed areas;
- Collaborate with community housing development organizations; and
- Provide technical and financial assistance and information to entrepreneurs and small business owners.

The City of Augusta is a HUD entitlement jurisdiction that receives and administers federal funds from the U.S. Department of Housing and Urban Development. Annual allocations are \$2.9 million in Community Development Block Grants, \$1.4 million in HOME Investment Partnerships Programs, and \$100,000 in Emergency Shelter grants. These programs support:

- Housing rehabilitation and home repairs required to bring clearly substandard homes into compliance with building codes;
- Private non-profit organizations and other developers that build new housing and renovate existing housing for low- and moderate-income persons
- Demolition and rebuild for households occupying severely deteriorated units.
- Demolition and clearance of deteriorated structures, with vacated lots made available for construction of affordable housing.

Improving Housing in Augusta

Recently, the Augusta HND worked with a client to demolish and rebuild a dilapidated, flood-prone home. All code requirements were satisfied.

The Augusta-Richmond County Extension Service. The Extension Service is a unit of the University of Georgia's College of Agricultural & Environmental Sciences that offers a number of programs in order to:

- Respond to citizen needs and interests in agriculture, the environment, families, and 4-H;
- Promote conservation of natural resources; and

-
- Promote increased agricultural profitability and pest management practices.

On the Cooperative Extension Service's homepage (<http://www.ces.uga.edu>) a number of publications related to disasters are available, primarily dealing with emotional reactions and adjustments.

6.6 Communicating about Flood Hazards

As of mid-2003, the City's website featured a special page for "Flood Plain Information." It identifies heavy rain as the primary cause of flooding and points out that citizens can learn more by referencing the Flood Insurance Rate Maps prepared by FEMA and on file with the Planning Commission. Citizens are advised to heed warnings, to tune to media for alerts, and about basic family safety and driver safety information. Warnings about turning off utilities and the hazards of enter buildings after damage are outlined.

The webpage explains flood insurance, with emphasis on the fact that property insurance policies do not cover flood damage. The 30-day warning period is highlighted, and citizens are advised not to wait until a flood warning is posted to seek financial protection.

The Augusta-Richmond County Planning Commission offers to check the official Flood Insurance Rate Map and tell property owners if their land and/or buildings are in a Special Flood Hazard Area. Advice on the permit requirements for new construction and substantial renovations or repairs of damage is offered.

The webpage outlines a number of property protection measures to reduce flood damage, including:

- Temporary (emergency) measures such include relocating possessions to the highest floor and placing sandbags or similar barriers to keep water away from buildings;
- Retrofitting, more permanent means, include elevating existing buildings; and
- Floodproofing with wall coatings to make the building walls and floor watertight.

Webpage viewers are advised to check with the Planning Commission before building on, altering, re-grading or placing fill on property because a Flood Plain Development Permit may be required. A separate section outlines the substantial improvement requirement and identifies the License and Inspections Department as responsible for enforcement.

The importance of drainage systems maintenance is highlighted as an important flood prevention effort that depends on citizen cooperation and assistance. Causes of drainage blockage are described so that citizens understand that plugged drainage channels, catch basins, ditches, detention ponds and drainage pipes cannot carry water.

Additional information is listed:

- Links to selected FEMA publications about disaster assistance and flood insurance;
- Insurance companies selling federal flood insurance;
- FEMA contact information for flood maps; and
- Frequently Asked Questions.

6.7 Post-Flood Actions

In response to flooding in 2000, the City created the Flood Damage Assessment Team. The Team is composed of staff from the Planning Commission, License & Inspections, Emergency Management, and a representative of the Construction Advisory Board. It is responsible for assessing flood damage and making substantial damage determinations.

The Public Works & Engineering Department inspects reported drainage problems, stormwater management facilities, and road culverts affected by flooding.

The Augusta Utilities Department manages increased wastewater inflows associated with increased infiltration and inflows due to rainfall and high water events. Reports of outages or damage to water lines or sewer lines are investigated and repairs are made, as appropriate.

The Emergency Management Agency coordinates with the Georgia Emergency Management Agency after major events; GEMA coordinates state personnel if required to assist with preliminary damage assessments.

6.8 Continued Compliance with the NFIP

The City of Augusta is firmly committed to continued compliance with the NFIP as evidenced by the commitment to regulating development and redevelopment, by adoption of provisions that exceed the minimum NFIP requirements, and by active pursuit of mitigation opportunities.

The City of Augusta satisfied requirements for initial participation and joined the NFIP in 1978; Richmond County joined in 1980. The effective Flood Insurance Rate Maps are the basis for delineation of the minimum flood hazard area for the purposes of regulating development. The maps have been revised a number of times to reflect more detailed information and changes to the floodplain,.

Regulations Review. A review of the City’s floodplain regulations and subdivision standards was prepared and City staff were interviewed. The review, on file with the Planning Commission, was performed to ensure continued compliance with the NFIP and to identify opportunities to clarify regulatory language. The regulations are consistent with the NFIP. A number of opportunities for improved consistency and clarification were identified.

Community Assistance Visit – 1990. The NFIP State Coordinating Office (Georgia DNR) met with staff of the Augusta-Richmond County Planning Commission. Staff were described as having “a fair understanding” of the NFIP and federal regulations. The resulting report identified some concerns and the City undertook followup immediately:

- No problems with the Floodplain Management Ordinance;
- Minor concerns with administrative and enforcement procedures;
- Minor concerns with flood maps;
- Serious concerns with NFIP Biennial Report data; and
- Potential violations were identified: field reconnaissance identified a number of structures that were built in the floodplain and copies of

Development Permits and Elevation Certificates for nine buildings were requested.

Community Assistance Visit – 2000. The NFIP State Coordinating Office (Georgia DNR) and a FEMA Region IV representative met with staff of the Augusta-Richmond County Planning Commission. Due, in part, to mid-year flooding, the Floodplain Management Ordinance and certain procedures were modified. The report acknowledged the merits of adopting more restrictive ordinance provisions, establishing a Flood Damage Assessment Team to assess damage and make substantial damage determinations, and providing Flood Information Packets to residents (see also Section 6.7). The report outlined additional results:

- Recommendation that in addition to requiring floodplain boundaries be delineated on Site Plans, that the preparer note the map panel number and date.
- Possible encroachment of fill into a floodway (subsequent investigation indicated it is not in the floodway).
- Height of foundation openings/flood vents higher than 12” above grade (subsequent investigation indicated the non-conforming openings are on the same side as the crawlspace door which has sufficient open area).
- Elevation Certificates required for buildings in the floodplain and errors in flood zone designations on some certificates (corrected elevation certificates were provided).

In response to the report, the City conveyed to all engineers and land surveyors a requirement that all Plot Plans, Site Plans, Development Plans, Final Plats, and all other plats submitted for approval must have a note regarding flood hazard areas, including identification of the map panel number and date. This requirement requires the note is to be placed on all documents, even if there is no floodplain affecting the site or if the building footprint is out of the floodplain. The requirement was subsequently incorporated into the appropriate ordinances.

The Community Rating System. The City has identified a number of its actions that may qualify for credit under the NFIP’s Community Rating System (CRS). The CRS is intended to recognize and encourage management of flood hazard areas above the minimum requirements of

the NFIP. Discounts on the cost of federal flood insurance are provided to those citizens who reside within recognized communities. The City of Augusta anticipates considering applying for the CRS.

Nationwide, the average NFIP premium for \$100,000 in coverage property in A Zones and AE Zones is on the order of \$500. Thus, in communities with a 5% CRS discount, policyholders see, on average, annual savings of \$25. The cost of the average B, C, and X Zone policy is \$150; thus policyholder savings in these zones outside of the 100-year floodplain would be only \$7.50 per year. Regardless of the CRS discount available in A and AE Zones, which goes up in 5-percent increments, the discount on B, C, and X Zones is capped at 5%.

For Augusta residents, cost savings due to the CRS discount can be estimated. Because nearly half of policies appear to be on buildings that are “out” of the mapped floodplain, for the purpose of this estimate a CRS discount of only 5% is assumed to apply to all policies. The total premium paid is approximately \$397,000; thus a 5% discount would yield a total savings for property owners of about \$19,800 each year.

An independent report identifying possible points based on the City’s current program, as well as a number of reasonable and feasible additional activities that may qualify for CRS points, is on file with the Planning Commission. The following are the key opportunities:

- Floodplain Management Ordinance requires the lowest floor, including basement, to be elevated at least 3-feet above the Base Flood Elevation.
- The requirement that lowest floors be at least 3-feet above the BFE is imposed on buildings located on lots that touch the floodplain even if the building is “out”
- The City regulates a portion of the flood fringe as floodway.
- Stormwater management for most new development in Rae’s Creek, Rocky Creek, and Rock Creek watersheds is required to meet higher standards to provide over-management.
- Significant efforts related to drainage maintenance and improvements are underway.
- 22 homes have been acquired and demolished (or are in the process of being acquired and demolished) to provide open space.

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- Significant public information efforts provide opportunities to continue to reach out to residents about flood hazards, mitigating damage, and flood insurance.
 - The City has prepared this *Flood Hazard Mitigation Plan*.
 - Efforts are made to expand the Greenspace program through fee simple acquisition of streamside areas and easement donations.

6.9 Natural Resources

The importance of protecting natural resources is recognized in several of the City's Development Documents, including the Comprehensive Plan and Comprehensive Zoning Ordinance that set the framework for long-term development. Regulations pertaining to specific proposals for land development require that wetlands, waterways and sensitive areas be delineated. This serves dual purposes: to encourage avoidance of those areas, and to more readily allow City staff to review potential impacts. Activity proposed within wetland areas must be approved by the U.S. Army Corps of Engineers under the authority of Section 404 of the Clean Water Act. Sediment and erosion control plans are required for most developments.

Natural resources are recognized and certain protections are provided in other regulations:

- Land Subdivision Regulations:
 - Individual sewerage disposal systems (if applicable) are to be designed per current Health Department regulations.
 - Delineation of wetlands per the National Inventory of Wetlands and, if subject to federal permit requirements, certain other submittals.
- Site Plan Regulations:
 - Delineation of wetlands per the National Wetlands Inventory.
 - Descriptive note describing permanent or temporary best management practices used to impact or target water quality.

Greenspace Program. The purpose of Augusta's Greenspace Program Plan is the permanent protection of undeveloped greenspace. It sets forth policies and specific proposals for long-term and short-term greenspace preservation and recognizes that funds for that purpose may come from several sources. The ultimate goal is the preservation of 20% of the City's land area (including approximately 20,000 acres of flood-prone

lands). The most environmentally sensitive lands are targeted: floodplains of the Savannah River, major tributaries, and Phinizy Swamp; and land along the Augusta Canal. The plan received broad public support as evidenced by input received at public meetings. The Central Savannah River Land Trust monitors the City's Greenspace Program and lands.

Since November 2000, nearly 800 acres have been permanently protected. These acquisitions, supported in part by a state grant of \$1.2 million, move the City towards a continuous greenbelt around the developed areas, beginning at the Columbia County line (and connecting to that county's trail system), and extending along the Levee to Phinizy Swamp and linking along Butler Creek to Fort Gordon. Table 6-3 identifies all Greenspace parcels, including those owned by the City and those owned by others that may not yet fully qualify under the State's definition.

Table 6-3
Status of Augusta's Greenspace (2003).

City Ownership (permanently protected)		Other Ownership (not yet permanently protected)	
Greenspace Site	Size (acres)	Greenspace Site	Size (acres)
Phinizy Swamp Nature Park	234.0	Phinizy Swamp wetlands mitigation site (owned by GDOT and leased to GDNR via a 50-year management agreement).	1,540
Butler Creek – Boy Scout Tract	75.0		
Butler Creek – Parham Tract	3.5		
Butler Creek – Sibley Tract	50.0	Several City-owned parcels between downtown and New Savannah Lock and Dam (some parcels may be needed for future development; surveys are required for further delineation).	479±
Butler Creek – Spence Tract	25.5		
Butler Creek – Woodlake Subdivision	120	Spirit Creek Educational Forest (owned by the Georgia Forestry Commission).	570
Rae's Creek – above golf course	4	Phinizy Swamp near New Savannah Lock and Dam (within 1,500 acres owned by the City, including sewerage treatment facilities and the Phinizy Swamp Nature Park).	616±
Spirit Creek – S Specialties Tract	36.0		
Savannah River Islands	10.0		
Savannah River/Augusta Canal	215.0		

The City proposes several mechanisms to expand greenspace, including: revisions to the Comprehensive Zoning Ordinance to promote greenspace in developments; a greenspace element in the Comprehensive Plan; pursuit of donations of land; fee simple purchase or placement of conservation easements on compatible land; and placement of conservation easements over certain City-owned properties. Barriers to achieving the goal are identified: lack of funding; insufficient tax incentives to encourage donations; and long-term maintenance concerns with taking title to a myriad of scattered tracts.

The Greenspace Plan describes the City's physical characteristics, rapid growth areas, population, and future land use. Areas that are significant natural areas that are protected and additional proposed areas for greenspace protection are described:

- Properties located on or adjacent to the Savannah River and the Augusta Canal are a mixture of floodplains and other buffer lands.
- Phinizy Swamp was created by ancient shifts in the Savannah River; some of it is farmed, some has been or is being mined, most has been timbered. It includes natural areas that are unique and most of it is within the floodplain.
- Butler Creek has seen aggressive pursuit of easements and fee simple acquisition of floodplain and buffer areas; this area will continue to be the City's first priority.
- Rae's Creek flows through a heavily urbanized area. The cost of land and easements has proven an obstacle to acquiring greenspace, even floodplain areas. The upper reach, in the Bel-Air area, where there is less existing development is a high priority.
- Rock Creek, Rocky Creek, Spirit Creek and McBean Creek are lower priority, but the City will encourage donations of easements and property, especially where there are significant environmental resources or opportunity to achieve connectivity with other public areas.

The Augusta Greenspace Plan details provisions of the City's Flood Damage Prevention Ordinance that "make it very difficult to develop property lying within the 100-year floodplains." In part, it is anticipated that these restrictions will help to encourage owners to grant easements or to make donations to the City or the Savannah River Land Trust (thereby

qualifying for tax benefits). These provisions serve to temporarily protect the floodplain as Greenspace:

- Limitations on grading; no fill to be brought into the floodplain;
- Lower floodway fringe to be treated as floodway;
- Stringent “no rise” certification requirements; and
- Three-foot freeboard above the Base Flood Elevation.

Tree Ordinance. The Tree Ordinance (adopted by reference at §8-4-1) provides standards for the protection of public trees, designates landmark trees, and provides landscaping standards for the development of private property (except single-family residential development). Where a Site Plan is required, a Landscape Plan must include a landscape element, a tree protection element, and a tree establishment element. The Tree Ordinance Illustrated Guide gives technical specifications for developing landscape plans and other purposes. The Landscape Plan is reviewed by the staff of the Planning Commission along with the rest of the Site Plan and it is subject to administrative approval by the staff or approval by the Augusta Tree Commission.

Groundwater Recharge Area Protection. The purpose of the Groundwater Recharge Area Protection Ordinance (codified as §8-6-1) is to manage land use within certain defined areas to ensure that the threat of groundwater pollution is minimized. The Ordinance sets standards that apply to waste disposal facilities, agricultural impoundments, hazardous material handling facilities, waste water basins, stormwater basins, wastewater spray and sludge operations, and homes or other land uses served by septic tank/drain systems. Minimum lot sizes are specified if septic tanks are used, based on pollution susceptibility, soil group, and slope, and are considerably larger than if public sewerage is available.

Part 7

Flood Mitigation Initiatives

7.1 Introduction

Augusta's experience with flooding goes back to its earliest years when the Savannah River periodically rose out of its banks. While the River's impacts have been mitigated by construction and operation of three major flood control dams and the Augusta Levee, it has been only in recent years that flooding has impacted smaller watersheds to the extent that it has prompted attention and action.

7.2 Augusta Levee

The Augusta Levee is about 11.5 miles long, running from the high ground on the south side of Rae's Creek to the high ground at New Savannah Bluff just south of Butler Creek. There are 5 gate structures; 2 railroad crossings, 1 road crossing, 2 combined road/rail crossings, and several road ramps, and one section of sheet pile wall.

Started in 1908 and completed between 1914 and 1916, the Flood of 1929 damaged certain sections that were rebuilt to "stand up against greater floods." In 1936, the U.S. Congress authorized improvements by the U.S. Army Corps of Engineers, which completed work in 1941. Initially, the Levee was designed to have two-feet of freeboard under a design discharge of 550,000 cubic feet per second (measured at the 5th Street Bridge water level gage, which is not operational).

The Clarks Hill Dam and Lake project began impounding water in December 1951 and continues to control the Savannah River. Analyses in the early '80s suggested the Levee would overtop during flows greater than 55,000 cfs, which had a stage of 30-feet on the Butler Creek gage and 51.8-feet at the 5th Street gage. At the time, this was characterized as the 0.2% annual chance flood (500-year). However, as shown in Figure 7-1, USGS measurements at Gage 02197000 (Savannah River at Augusta), discharges on this well-regulated river have exceeded 50,000 cfs only 5 times since 1950.

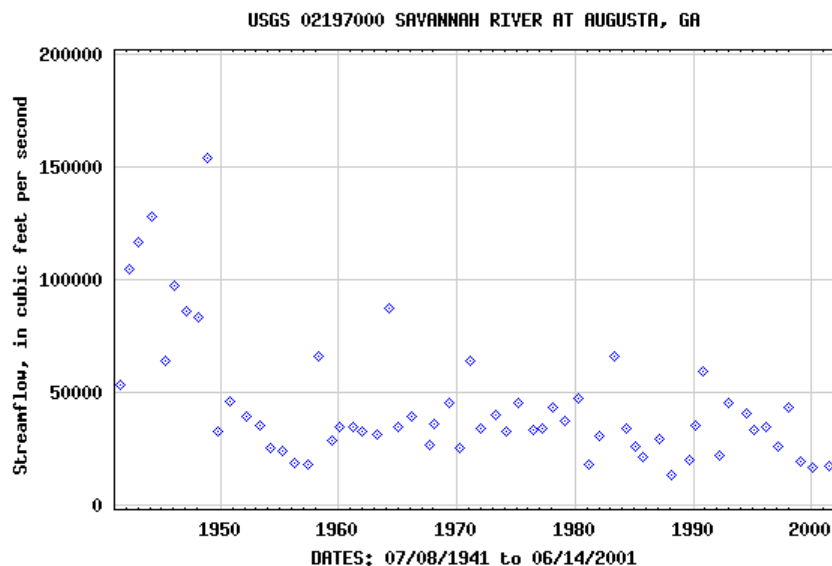


Figure 7-1. USGS Savannah River Gage at Augusta.

The City of Augusta is the local sponsor and owns, operates, and maintains the Levee. The Operations and Maintenance Manual, prepared in 1984 by the Corps of Engineers, acknowledges that the effectiveness of the levee depends on people in three key ways, each is addressed in detail: routine maintenance; inspection and periodic reporting; and operations and flood fight.

With respect to permanent development on the Levee, the Corps did not have the authority (under then-current legislation) to approve permanent modifications. General criteria for encroachments are set forth and a procedure is outlined, including a requirement that the City Engineer certify that the design of any encroachment “does not affect the levee integrity or impair his ability to operate or maintain the levee and perform flood fights.”

7.3 Other Flood Reduction Projects

The City of Augusta has experienced flooding throughout its history, with the primary focus on the Savannah River in the early part of the 20th Century. In the last 20 years, flooding along the smaller waterways has

gained attention, in part due to the apparent increase in severity and frequency of flooding and damage.

7.3.1 Floodplain Acquisitions

Prompted by significant flooding in 1998, which resulted in Presidential Declaration DR 1209, the City began to consider seeking federal grant funds to acquire a number of flood-damaged homes. There were many more damaged homes than available funding; for the most part the selection was driven by federal and state emphasis and the limited amount of available funds.

A federal Hazard Mitigation Grant Program grant of \$687,700 (to cover 75% of eligible costs) was awarded through the Georgia Emergency Management Agency for the acquisition and removal of 12 substantially damaged and repetitive loss properties (8 were in FEMA's "repetitive loss target group"). Although homes were located in several places (green circles on Map 5-4) many were concentrated in the Hollywood Subdivision. The State provided 15% and the City provided 10% towards the 25% non-federal match (Table 7-1). The last home in this group was demolished in late 2002.

Floods in 2002, although not qualifying as a major disaster declaration, caused extensive damage in Augusta. As a result, the City applied for and received grant funds to pursue additional homes. An additional grant was approved in late August, bringing the total to 22 homes (Table 7-1). As of late 2003, an additional grant was pending through FEMA's Pre-Disaster Mitigation Grant Program.

Table 7-1
Floodplain Acquisition Grants (as of mid-2003).

	Federal (75%) & State (15%)	Local Share (10%)	Total Project Cost
Phase 1: Original Application (12 homes)	\$618,928	\$68,770	\$687,698
Phase 2: Dominion Way (4 homes)	\$301,612	\$33,512	\$335,124
Phase 3: Approved late August 2003 (6 homes)	\$303,509	\$33,729	\$337,298

As a condition of the mitigation grants, the acquired lands must be retained as open space. As shown on Map 5-3, the locations of these lots are in several locations, which complicates re-use for recreational purposes or other compatible open space purposes. The Hollywood area, where some homes have been acquired and several others have been abandoned due to repetitive flood damage, may be a suitable site for wetlands. If buildings can be removed from a large, contiguous area, the land would likely readily revert to wetlands, given the frequency of flooding.

7.3.2 Rae's Creek Improvements

Prompted by repeated flooding in the early 1990s, the City undertook a \$1.4 million stream improvement project on Rae's Creek. From Lake Olmstead upstream to about Wrightsboro Road, the stream was cleaned and widened. To reduce streambank erosion, riprap was placed on the banks.

7.3.3 Oates Creek Project

In 1986, the U.S. Army Corps of Engineers prepared the Oates Creek Flood Control Project design. The project, constructed in the late 1980s, was expected to provide an average annual flood damage reduction benefit of \$1.78 million (1979 dollars). The project is designed to carry discharges for the 10-year to 25-year floods, but is expected to reduce or eliminate flooding of 218 homes by the 1%-annual chance flood (100-year). The channel improvement project modified the Oates Creek mainstream and Tributary No. 1 and consisted of several components:

- Realignment of the waterway from its confluence with Beaver Dam Ditch upstream to the New Savannah Road Bridge;
- Just over a mile of rectangular cross-section, concrete-lined channel, ranging from 30- to 40-feet wide;
- Over 6,600 feet of grass-lined channel with sloped sides and bottom widths of 10- to 60-feet;
- A low earth levee on the south bank downstream of Central of Georgia Railroad crossing, extending 1,800 feet long and ranging from 4- to 9-feet high; and
- Modifications to a bridge and utilities.

Richmond County was the original non-federal sponsor and project owner. As part of the consolidation of governments, the City of Augusta became the project owner. The City, in conjunction with the Corps of Engineers, inspects the project twice a year. Reportedly, “high flood control efficiency” is achieved, but modifications are planned to reduce excessive annual maintenance requirements and costs. To concentrate low flows and to minimize sediment deposition, the bottom of the upper portion of earthen channel will be regraded and concrete pilot channel will be constructed in the lower portion of earthen channel. Rip-rap will be placed on channel slopes and at other locations to reduce erosion. Construction is expected to begin in October 2003 and be completed within 12 months.

7.3.4 Georgia DOT and Cranes Creek

Georgia Department of Transportation is designing two projects in the Cranes Creek watershed that are anticipated to provide some flood relief, although the degree of relief has not yet been determined due to on-going design factors:

- The I-20/Cranes Creek project to prevent flooding of Interstate 20 at Cranes Creek; and
- The I-20/I-520 Interchange project with stormwater detention ponds

Two other DOT projects in Cranes Creek are in the design phase; both will include stormwater management measures to manage runoff increases associated with the project only:

- The Davis Road Widening project; and
- The Interstate 20 Widening project from Bel-Air Road to the Augusta Canal.

Background. A significant flooding event occurred on June 20, 2000, when Cranes Creek overtopped Interstate 20. Interstate 20 is a major hurricane evacuation route for this area of Georgia and South Carolina. Many homes in the area were also flooded. These homes have had repetitive flood losses and several are abandoned as a result of the June 20, 2000 flooding.

Elevating I-20 at Cranes Creek. In late spring of 2003, the concept for the final alternative and the environmental document were approved by the Georgia Department of Transportation and FHWA in late spring of 2003.

Leading up to the concept approval, hydrologic and hydraulic analyses were performed to update the current Flood Insurance Study (FIS) for Cranes Creek which is based on modeling performed in 1976 and does not accurately represent the increased development and to incorporate changes due to several culvert replacements. This work involved field inspections and surveys, meetings with City personnel to discuss flooding issues, and hydrologic and hydraulic analysis using GIS mapping to depict the current land uses. A Letter of Map Revision (LOMR) is under review by FEMA. The new study is the basis used to develop alternatives to prevent the overtopping of I-20.

The contractor also examined alternatives to address flooding along Cranes Creek, discussed with Cranes Creek Stakeholders in May 2001 (include local, state and federal government representatives, including EPA, U.S. Army Corps of Engineers, GDOT, FHWA, U.S. Fish and Wildlife, and FEMA). Based on stakeholder input, several alternatives were selected for further conceptual analysis, including environmental and hydrologic and hydraulic analyses, leading to preparation of a NEPA environmental document.

The Cranes Creek Stakeholders met in February 2002 to provide input to the selection of the final alternative(s). The alternative selected, to raise the road while maintaining current flood elevations both upstream and downstream, include three parts:

- Raise I-20 to provide safe evacuation access.
- Build three additional box culverts to provide conveyance under I-20. Low flows will continue to be conveyed through the existing single 10'x10' box culvert. Flows will not have access into the additional proposed three box culverts until the flow reaches the level of the proposed weir box.

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- The weir box is to be built upstream of I-20 where Cranes Creek crosses. The weir will be set at the existing roadway elevations of I-20 and will be open on all four sides with an approximate total length of 300 feet. The additional box culverts will be built into the downstream side of the weir box to convey discharges that exceed the weir level.

I-20/I-520 Interchange Reconstruction, with Stormwater Detention Pond. The project includes grade separation of one nearby intersection (I-520 at Scott Nixon Memorial Drive), new loop ramps that will be reconfigured to flyover ramps, and realignment of the other two loop ramps. The new loop ramps and flyovers allow for construction of twelve stormwater detention ponds to provide additional flood relief by staggering the peak release rates of stormwater flows along Cranes Creek. These ponds were designed beyond the Georgia Department of Transportation guidelines for detention ponds to provide “over-detention” of the stormwater flows draining to the ponds, although the degree to which the “over-detention” may reduce downstream flood elevation will not be finalized until the final design phase is completed. The project should be ready for construction in 2004.

7.4 Flood Mitigation Studies

Because of the complexity of flooding, the typical first step towards mitigating risk is to conduct a study. Factors that must be taken into consideration include the causes of flooding (such as changes in land use, inadequate channel capacity, undersized road crossings, building and other activities that block the passage of water, and others) as well as a variety of solutions. Solutions generally are of two types:

- **Structural measures** include traditional approaches such as building dams to capture water in the upper basin or levees and floodwalls to prevent water from spreading away from the channel. Digging wider and deeper channels may be effective in some cases, although long-term maintenance costs can be high.
- **Nonstructural measures** include such activities as buyout of flood-prone buildings, raising existing buildings on higher foundations, and minor alterations to reduce damage while allowing buildings to continue to flood.

In recent years, Augusta has prepared a study of Rae's Creek and a significant study by the U.S. Army Corps of Engineers is underway.

7.4.1 Corps of Engineers: Flood Reduction Study

The U.S. Army Corps of Engineers, Savannah District, initially looked at six watersheds in the City of Augusta. Four were selected for further consideration: Rae's Creek; Augusta Canal; Phinizy Ditch; and Rocky Creek (not selected were Beaver Dam Ditch and Butler Creek). As of mid-2003, progress is slowed due to funding constraints with activity only for the Rae's Creek and Rocky Creek areas.

In late 2003, the Corps' feasibility work will be completed to identify specific projects and those elements that do and do not qualify for funding. Any project that is eligible for Corps funding will require a non-federal cost share. Effective projects that do not qualify under the Corps' programs may be considered by the City. Alternatives that will be considered include nonstructural measures (such as acquisition, elevation-in-place, and floodproofing). An expert consulted with the Corps Team in the Spring of 2003, resulting in an emphasis on nonstructural measures.

The hydrology and hydraulic analyses for both existing conditions and future conditions (extrapolated from the 1995 Land Use Plan and the 1992 Comprehensive Plan) have been completed. FEMA is represented on the team. The Corps' modeling meets FEMA specifications and is expected to support map revisions. Detailed elevation data (ground, lowest floor) have been collected by survey. Initial impacts indicate:

- Rocky Creek: average annual damages of \$1,450,000 (not including industrial). Flood-prone structures include approximately 1,000 homes (average value \$30,000) and 200 commercial/industrial.
- Rae's Creek: average annual damages of \$1,480,000 (for only about half the number of structures in Rocky Creek, reflecting higher home values). The confluence with Cranes Creek is a primary damage area. The upper reach was not analyzed in detail, in part because of assumed flood reduction benefits associated with a Georgia DOT project.

7.2.2 Rae's Creek Hydrology Study (2001)

In 2000, the City contracted for a study to examine four known or potential problem areas along Rae's Creek between Jackson Road and Walton Way. As of mid-2003, no specific actions have been taken, pending the outcome of the Corps of Engineers' study. The report recommended:

- Repair existing spillway and construct additional emergency spillway capacity at Walton Way/Lake Aumond.
- To meet target flood elevations at West Lake Forest Drive and Heirs Pond, construction additional outlet culvert at Heirs Pond and stabilize downstream banks to correct existing slope erosion.
- Discontinue routine operation of gates on Heirs Pond and Lake Aumond because they do not provide any peak flow reduction benefits for Forest Hills Racquet Club and downstream areas; without measurable benefits, City personnel are placed at risk unnecessarily while operating the gates.
- Widen Rae's Creek from the upstream end of Heirs Pond upstream to Jackson Road; throughout this reach, remove block walls that obstruct and divert flows; replace Courtside Drive with box beam bridge.

Part 8

Mitigation Actions

8.1 Identifying Priority Actions

Throughout the planning process, the Mitigation Planning Committee considered hazards, the number of people and types of property that are exposed, and the development review process. Based on a review of the background materials and the Committee's understanding, potential actions were identified, circulated, reviewed, and prioritized. Of these draft actions, several were combined and/or modified.

Factors that influenced prioritizing included the Committee's review of available information on flood hazards, other hazards, past hazard events, the number of people and types of property exposed to those hazards, and the elements of the development approval process. High priority was placed on those actions that are considered consistent with current City policies, those that are technically feasible and have high political and social acceptance, and those that can be achieved using existing authorities, budget levels, and staff. However, it was discussed that short-term constraints should not significantly influence priorities, as those priorities may support budgetary shifts and staff efforts.

One item was discussed and subsequently deferred for consideration during the multi-hazard mitigation planning process: identify hazardous materials handlers that may be affected by flood hazards and encourage consideration of appropriate protection measures, if not already undertaken.

8.2 Mitigation Actions

Many suggestions for actions and subactions were considered. The list was refined to eleven priority actions, most with several subactions. The Committee agreed that progress should be made on all identified actions within the first 5-year period, although it is recognized that many may not be completed in that timeframe, in part due to their on-going nature. The order of the following list does imply a priority, but is not intended to preclude activity on lower priority actions.

Action A: Drainage and Stormwater Management. As evidenced by the nature and number of drainage improvement needs identified by the

City, the number and distribution of stormwater management facilities, and citizen complaints, the City's drainage system infrastructure is stressed. To facilitate identifying critical needs that may help minimize flooding:

- Implement central database for staff to record drainage and flooding problems (build on existing software).
- Train staff of all departments that receive citizen calls to use the database to register appropriate information to ensure quality data.
- Develop method to consider the database contents in setting priorities for drainage projects and to support identification of flood mitigation opportunities.
- Formalize detention basin maintenance procedures and system to prioritize maintenance.

Action B: Flood Warning. Augusta's watersheds are relatively small and tend to respond rapidly to heavy rainfall, making it difficult to use the traditional door-to-door notification to adequately warn residents to evacuate. For the same reason, placing barricades or City personnel at flood-prone roads is problematic, especially in the upper reaches of watersheds. To enhance flood safety:

- Use GIS and flood maps to identify buildings within flood hazard areas and develop phone groups for automated, generalized flood warning announcements through 911 Message; exercise the announcement system periodically.
- Explore whether the automated rain gages that may be installed by Augusta Utilities as part of watershed assessments can be used to augment the City's preparations during times when flooding is likely.
- Improve the list of flood-prone roads; evaluate whether the most frequently flooded areas warrant signs to alert the traveling public.

Action C: Public Awareness Initiative. Mitigation is a partnership and citizens are both obligated and responsible for certain actions to help reduce exposure to flooding and to improve the City's ability to recover from flooding. To increase public awareness and responsibility, convene a work group (e.g., City departments, neighborhood associations, NRCS/SCS, Corps of Engineers, others) to prepare and implement a multi-year plan for public awareness, which may include but is not limited to such elements as:

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- Encourage property owner purchase of flood insurance to provide financial protection that helps personal recovery
 - Encourage property owner purchase of flood insurance to increase options for post-flood mitigation (because of Increased Cost of Compliance insurance coverage).
 - Prepare articles for publication emphasizing what property owners can do to plan and prepare for floods and to reduce losses (flooded road safety, low cost mitigation measures, insurance, the automated 911 Message flood warning alerts).
 - Coordinate with campaigns undertaken by the State (flood awareness, winter storm awareness, etc.).
 - Develop web-based materials; link to selected other sites (GEMA, FEMA, Red Cross, Extension Service).
 - Co-op with stormwater management initiative to distribute periodic mailing to property owners along waterways to inform them of their responsibility to keep drainageways clear (don't dump debris, yard clippings, tree limbs, etc.).
 - Develop materials for the Planning Commission and License & Inspections to handout with permits or mailings (tailored for homeowners, business owners, and owners of vacant lands). Topics to include flood insurance, mitigation options, flood safety, permit requirements, others.
 - Improve consistency of communication to the public regarding flooding, prepare briefing of basic information for City staff who field calls or meet with citizens groups.
 - Establish a hotline for citizen reports of flooding and drainage problems.
 - Request and sponsor periodic NFIP workshops provided by others (GDNR, FEMA) for lenders, insurance agents, real estate professionals and others.
 - To facilitate preparation of Elevation Certificates and other uses, post database of elevation benchmarks and reference marks on the City's webpage and notify local surveyors and engineers of its availability.
 - Research options to improve disclosure of flood hazards as part of the property transfer process.

Action D: Flood Hazard Map Revisions and Updates. The FEMA flood maps are used in several ways, and the uses are increasing. The maps are used to determine which lands are subject to the provisions of the Flood Damage Prevention Ordinance, to identify "at risk" buildings

and infrastructure, to delineate those portions of properties that may be considered for Greenspace, to guide development to less hazardous areas, to identify property owners for public awareness initiatives, and for other purposes. The U.S. Army Corps of Engineers has prepared revised floodplain models and draft maps for four waterways and FEMA Region IV has indicated that preparing a new, digital flood map for Augusta is a high priority. To facilitate the City's floodplain management efforts:

- Pursue City-wide revision of the Flood Insurance Rate Maps, building on the City's new digital topography and work underway by the U.S. Army Corps of Engineers to prepare flood studies as part of the *Flood Reduction Study* (including Rocky Creek, Rae's Creek, Crane Creek, Augusta Canal and Phinizy Swamp), and including other studies and identified watersheds.
- Communicate to the Georgia Department of Natural Resources and FEMA Region IV the importance of receiving revised maps in the Digital Flood Insurance Rate Map format.
- When available for local use, annotate digital map with the "lower floodway fringe" delineation to facilitate awareness of and application of the Flood Damage Prevention Ordinance and to more clearly identify areas targeted for Greenspace purposes.
- Incorporate the new flood maps into the City's GIS.
- Develop a database of property owners for use in public awareness activities.

Action E: Flood Mitigation Projects. At this time, based on the Q3 digital flood damage it is estimated that 61 buildings are located within floodways (not all waterways have mapped floodways), and about 50 separate properties have received multiple NFIP flood insurance claim payments (about 13 of these properties have been acquired, along with 11 other properties). Continue efforts to mitigate future flood damage of older buildings in high-risk problem areas by undertaking the following:

- Develop Flood Mitigation Project Policies and Procedures Manual.
- Establish systematic method for using and prioritizing funds, including a mechanism to account for changes in priorities as a function of several variables (such as the funding agency's priorities, recent flooding, degree of damage, damage history, predicted depth of flooding, existing drainage problems, sewer infiltration, proximity to other public open space/Greenspace, etc.).

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- Gather data on buildings in FEMA-mapped floodways and repetitive loss areas to have available in the post-flood period; use to target efforts for recovery, permitting, and grant application development.
 - Obtain FEMA's Residential Substantial Damage Estimator software and maintain ability to use it to facilitate damage estimates and substantial damage determinations.
 - Develop policy on abandoned homes in SFHA (donations, condemn, demolish, HUD funds).
 - Examine the Corps' database of buildings in the SFHA and pre-identify those most likely to sustain significant damage if floods equivalent to the SFHA or greater occur, i.e., those predicted to have more than 2-feet of water above the lowest floor. Use the identified list to target post-flood inspections.
 - Maintain awareness of different sources of mitigation funding (pre-disaster, post-disaster, CDBG/HOME, NFIP flood insurance claims payments, etc).
 - Continue to seek mitigation grant funds to implement mitigation in high priority actions.
 - Explore with GDOT whether, as part of its environmental enhancement and wetlands mitigation requirements, funding could support additional buyouts areas where the frequency of flooding indicates the hydrology would support allowing areas to return to wetland functions.
 - Include consideration of flood mitigation opportunities in the City's identification of projects for which ISTEA applications will be prepared, which may include projects to preserve floodway greenspace or floodplain buyouts in areas where detention is required or wetlands are desirable.

Action F: Soil Erosion and Sediment Control. Based on experience throughout the City, public comments, and other factors, it appears that sedimentation in waterways may be contributing to drainage problems and flooding. While streams naturally carry some sediment during high water events, material that washes off of construction sites can contribute excessive loading. The City requires erosion control measures for certain land disturbing activities (see Section 6.2.2), including its own projects, and certain activities are excluded.

- Due to the significant size and duration of four projects proposed by Georgia DOT for the upper part of the Crane Creek basin, and the high visibility of downstream flooding, request GDOT's continued attention to exemplary sediment and erosion control practices.

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- Communicate with City crews and contractors that City projects are to be undertaken with exemplary sediment and erosion control practices.
 - Examine the feasibility of offering training for local contractors to reinforce proper installation and maintenance of sediment control measures; seek cooperative partners, including the District Soil Conservation Office, Georgia DOT, and GA Department of Natural Resources.
 - Increase frequency of inspections of sediment control measures and work with project owner/contractor to maintain effective measures throughout construction.
 - Continue cooperative efforts with Columbia County regarding installation and maintenance of sediment and erosion control measures on active construction sites in the upper portions of waterways that drain into Augusta, with particular attention to Crane Creek, Rae's Creek, and Butler Creek).

Action G: Flood Mitigation Staffing. Seek new position to coordinate the City's floodplain management and mitigation efforts. Functions would include: leadership for implementation and tracking of priority action items identified in the Plan; provide staff review of permit applications for floodplain development; function as the City's Community Rating System Coordinator; develop policies and procedures, apply for, and administer mitigation grants; coordinate the City's interaction with the U.S. Army Corps of Engineers; coordinate multi-year effort to revise FIRMs; coordinate the Flood Damage Assessment Team (with L&I) for substantial damage determinations; serve as liaison with press and the public on matters related to flooding.

Action H: NFIP Community Rating System. Based on current digital flood maps, approximately 4,000 buildings may be located in Augusta's floodplains, yet fewer than 15% are covered by flood insurance (other buildings that are "outside" of the mapped floodplain also are insured). On questionnaires, a number of citizens indicated flood insurance is "too expensive." The NFIP Community Rating System credits communities for sound floodplain management practices that exceed federal minimum requirements and results in discounts on flood insurance premiums. To encourage the purchase of flood insurance and to save citizens money, pursue a Class 8 or higher in the Community Rating System. One

measure of the benefits of joining the CRS is suggested by considering that existing policyholders pay about \$394,000 in annual premium on 901 policies; a 5% discount would save about \$19,000; a 10% discount would save about \$38,000.

Action I: Sewer Line Infiltration & Inflow. Continue to undertake projects to identify and resolve infiltration and inflow. During wet weather and flooding conditions, water infiltrates into sewer lines and flows into the system through submerged manhole covers, increasing treatment costs. It is estimated that 70% of the problem is on private property and includes illegal connections of roof drains. Section 5.4 describes increased treatment costs associated with rain and flood events.

Action J: Savannah River Flood Protection & Awareness. Although there is a very low probability that flood levels on the Savannah River would prompt closure of the 8 breaches in the Levee, the consequences of such flooding would be catastrophic. Residential and non-residential uses exist on the riverside of the levee (some on City-owned land) and may be subject to damage at different floodwater levels. Section 5.2.1 summarizes apparent risk (using the Base Flood Elevation (100-year) information shown on FEMA's map). To enhance protection and awareness:

- Convene a City work group to review and revise the Levee Closure Plan.
- For City-owned property on the riverside of the Levee that is leased to private entities, examine lease conditions with respect to adequate advisory language to protect the City. Consider whether lessees should be notified of the risk of flooding; that the City periodically conduct a levee closing exercise; and that certain conditions of flooding predicted by the U.S. Army Corps of Engineers may prompt the City to require evacuation. Other topics for consideration: the availability of flood insurance to cover losses (for both structure and contents); the requirement to obtain permits for building improvements, additions, and repair of damage; termination of leases under certain circumstances (e.g., if buildings are substantially damaged by any cause (e.g., flood or fire); etc.
- Notify privately-owned property on the river side of the Levee about the risk of flooding, levee closing procedures, requirement to evacuate, availability of flood insurance, and the requirement to obtain permits.

Action K: Dam Safety. For State-designated Category I dams that are located in the City or on waterways that drain through the City, determine if the downstream risk is sufficient to contact owners to encourage their development of limited emergency action plan procedures, and periodic inspections, that are coordinated with the City.

8.2.1 Implementation of Actions

Table 8-1 identifies the proposed lead office and support assignments, priority level, and timeframe for the City’s high priority actions. The proposed timeframes are consistent with the five-year review cycle required for this Plan. For each high priority action, the Committee identified the lead office, characterized anticipated support by elected officials and the community at-large, discussed funding limitations and status, and developed a qualitative statement regarding cost effectiveness. In this context, the “cost” of accomplishing the action was compared to the perceived “benefits,” including community-wide safety.

Medium priority actions and low priority actions (Table 8-2) are scheduled for further consideration when the City undertakes the comprehensive review. Lead offices and other factors will be discussed and documented during the Plan revision. At that time, it is expected that new actions will be identified and a process to prioritize all remaining actions will be undertaken.

An updated version of this table will be included in periodic progress reports submitted to the Georgia Emergency Management Agency and FEMA.

Table 8-1
Mitigation Actions: Time Period FY2003 – FY2008

Action A: Drainage and Stormwater Management.	
Lead Office	Lead: Public Works & Engineering Support: Planning & Zoning
Support¹	Well received, given citizen comments.
Status & Funding Notes	Planning is underway to acquire the software and develop methods to help prioritize projects.
Cost Effectiveness²	For optimal implementation, additional staff and/or funding are required. Long-term benefit, short-term high costs.
Action B: Flood Warning.	
Lead Office	Lead: Emergency Management Agency Support: Information Technology, Public Works & Engineering, Augusta Utilities
Support	Broad support
Status & Funding Notes	Exploring grant funds to support gages; implementation with existing budget
Cost Effectiveness	Low investment, potential significant benefits to improve response
Action C: Public Awareness Initiative.	
Lead Office	Lead: Administrator's Office Support: All Departments
Support	Broad-based strong support
Status & Funding Notes	Implementing most elements within existing budget; some elements will require additional funding, handout/mailed developed during planning;
Cost Effectiveness	Cost effective to encourage citizen action
Action D: Flood Hazard Map Revisions and Updates.	
Lead Office	Lead: Planning & Zoning Support: Public Works & Engineering, Information Technology
Support	Technical communities will support; anticipate mixed reactions from property owners where flood boundaries change
Status & Funding Notes	Generally within existing budget; City to provide topography; GIS effort to incorporate City-specific annotations may exceed available staff time.
Cost Effectiveness	City's effort is low cost, high benefit.

¹ Estimate of community support (elected officials and citizens).

² Based on qualitative assessment of cost/effort and long-term benefits.

Table 8-1
Mitigation Actions: Time Period FY2003 – FY2008

Action E: Flood Mitigation Projects.	
Lead Office	Lead: Planning & Zoning Support: Committee of other departments
Support	Broadbased, especially by repetitively flooded or severely damaged property owners
Status & Funding Notes	For optimal implementation, additional staff and/or funding are required.
Cost Effectiveness	Improves likelihood of qualifying for funding to implement projects.
Action F: Soil Erosion and Sediment Control.	
Lead Office	Lead: Public Works & Engineering (commercial; site plans) and License & Inspection (single family homes) Support: Soil Conservation; Planning & Zoning
Support	Generally well received by citizens
Status & Funding Notes	For optimal implementation, additional staff and/or funding are required, especially to perform additional inspections
Cost Effectiveness	Potential to reduce long-term channel maintenance and enhance environment
Action G: Flood Mitigation Staffing.	
Lead Office	Lead: Planning & Zoning Support: Emergency Management, Public Works & Engineering, License & Inspection
Support	Generally positive due to extent of actions identified and increasing frequency of flooding
Status & Funding Notes	Concern regarding overall progress unless leadership role is created; not within existing budget
Cost Effectiveness	Cost effective to invest in damage reduction over the long term; increases likelihood of grant funding
Action H: NFIP Community Rating System.	
Lead Office	Lead: Planning & Zoning Support: Public Works & Engineering, License & Inspections
Support	Broad support by NFIP policyholders.
Status & Funding Notes	For optimal implementation, additional staff is required
Cost Effectiveness	Savings for citizens; City costs for staff & documentation
Action I: Sewer Line Infiltration & Inflow.	
Lead Office	Lead: Augusta Utilities Support: --
Support	Public support depends on public awareness of the costs of not correcting
Status & Funding Notes	Ongoing program funded through existing capital improvement program
Cost Effectiveness	Long term effectiveness limited due to extent of problems on private property

Table 8-1
Mitigation Actions: Time Period FY2003 – FY2008

Action J: Savannah River Flood Protection & Awareness.	
Lead Office	Lead: Public Works & Engineering, Emergency Management Support: Departments with role in Levee Closure
Support	Neutral
Status & Funding Notes	Within existing budget and staffing
Cost Effectiveness	Unknown (very low probability, high consequence)
Action K: Dam Safety.	
Lead Office	Lead: Emergency Management Support: Public Works & Engineering
Support	Minimal due to lack of awareness
Status & Funding Notes	Within existing budget
Cost Effectiveness	Effective, given number of past damage events

8.3 Links to Mitigation Goal Statement

The City of Augusta

Flood Hazard Mitigation Goal Statement

It is the goal of the City of Augusta, Georgia, to protect public health, safety and welfare and to reduce losses due to flood hazards:

- *By identifying flood hazards and drainage problems;*
- *By guiding development away from flood hazard areas to support preservation of Greenspace and sensitive areas;*
- *By identifying and pursuing mitigation measures to reduce exposure of citizens and property to flood hazards; and*
- *By increasing the public's awareness of their obligations and responsibilities for personal planning, preparedness and recovery.*

Table 8-2 shows how the proposed actions listed in Section 8.1 directly support the City’s Mitigation Goal Statement. A number of actions individually support more than one element of the goal.

Table 8-2
Linking Mitigation Goals & Actions.

Element of Goal Statement	Actions Relating to Goal
Identifying flood hazards and drainage problems	A, B, D, K
Guide development away from flood hazard areas to support preservation of Greenspace and sensitive areas	D, G
Identify and pursue mitigation measures to reduce exposure of citizens and property to flood hazards	A, C, E, F, G, I
Increase the public's awareness of their obligations and responsibilities for personal planning, preparedness and recovery	B, C, G, H, I, J

Part 9

Georgia Agencies & FEMA Programs

9.1 Overview

Mitigation of flood hazards traces its roots to Congressional deliberations about how to address continued and repetitive flood disasters throughout the first half of the 20th Century. The National Flood Insurance Program, authorized in 1968, prompted state and local government actions primarily intended to recognize and account for flood hazards in decisions on local development. It was not until 1988 that the concept of natural hazards mitigation planning was articulated in a statute, known as “Section 409” planning. In 2000, the statute was revised under the Disaster Mitigation Act of 2000.

At the federal level, the Federal Emergency Management Agency administers mitigation programs that foster planning and project implementation to address existing risks. At the state and regional levels, several agencies and organizations sponsor programs that bear on hazard mitigation. The following four sections provide an overview of existing Georgia agencies. The last two sections are overviews of FEMA programs that support hazard mitigation.

9.2 Georgia Emergency Management Agency

The Georgia Emergency Management Agency (GEMA) is the lead state agency for disaster preparedness, response, recovery, and mitigation. As stated in the State’s Disaster Policy, the State “is under the constant threat of a broad range of disasters, both natural and man-made.” The agency is charged with ensuring that the State’s preparations will be adequate, providing for the common defense, protecting the public peace, health, and safety, and protecting the lives and property of the people of the State.

GEMA is responsible for advising the Governor, state government officials and local governments of the nature, magnitude, and possible effects of natural and technological disasters or emergencies. As articulated in the Georgia Hazard Mitigation Strategy (2000), GEMA initiatives include:

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- **Mitigation Grant Programs.** GEMA is charged with administering federal mitigation funds and programs related to hazard mitigation: public information; FEMA's pre- and post-disaster mitigation grant programs; the NFIP Flood Mitigation Assistance program; disaster resistant communities initiatives; hurricane preparedness; and state mitigation plan updates.

GEMA's Approaches to Mitigation

Implementing effective hazard mitigation in high-risk areas involves several approaches. The State of Georgia encourages the use of non-structural hazard mitigation measures before undertaking structural mitigation approaches.

Georgia Hazard Mitigation Strategy (2000)

- **Local and State Mitigation Planning** support is provided to help reduce the unacceptable loss of life and property from natural disasters by working with communities to develop local hazard mitigation plans. The strategy is developed to assess the effectiveness of ongoing programs and activities in the community, identify shortfalls, identify additional measures that must be undertaken to eliminate our exposure to future natural disasters, and outline a strategy for implementation of these measures.
- **Georgia Mitigation Empowerment Initiative** supports communities to identify worthy mitigation projects. The initial objective was to provide the tools to map critical facilities that are either crucial to government operations or that are imminently threatened by disasters.
- **Data Transmission Network** is a statewide initiative to provide local emergency management personnel in every county access to immediate weather information and warnings. The objective is to reduce the incidence of injuries and/or fatalities to persons because of disasters caused by severe weather occurrences. Counties received a Weather Center system, technical assistance, and subscription cost for a period of 18 months.
- **Weather Radio Initiative**, supported by FEMA funding in 2000, GEMA helps to provide storm alert radios to schools, day care centers, hospitals, 911 facilities, governmental offices and other vital Georgia agencies to ensure advance warning of approaching severe weather.

9.3 Georgia Department of Natural Resources

The Georgia Department of Natural Resources (www.dnr.state.ga.us) is a diversified agency with the mission to sustain, enhance, protect, and conserve Georgia's natural, historic, and cultural resources for present and future generations, while promoting the development of commerce and industry that use sound environmental practices. Among programs that have bearing on mitigation of natural hazards are the following:

- **Georgia Greenspace Program.** The program establishes a framework within which developed and rapidly developing communities can preserve greenspace through adoption of policies and rules to preserve at least 20 percent of their land areas as connected and open greenspace that can be used for informal recreation and natural resource protection. The Georgia Greenspace Trust Fund may include appropriated state funds, federal funds, donated funds, and any interest income.
- **Water Supply.** The Water Protection Branch is responsible for protecting Georgia's surface waters. It regulates municipal and industrial wastewater discharges, non-point source pollution, storm water discharges, erosion and sedimentation and conducts monitoring and modeling of Georgia's waterways. The Water Resources Branch regulates the use of Georgia's surface and ground water resources for drinking water, impoundment, agricultural irrigation, and other non-agricultural uses. In 2000, the Governor commissioned the Drought Study Team to take a comprehensive look at causative factors of droughts, as well as various prevention and mitigation measures that could be explored by the state and local governments in Georgia.
- **State Floodplain Management.** Sixty-two percent of Georgia local jurisdictions participate in the National Flood Insurance Program (429 of 695 communities). The program provides technical assistance and workshops for community officials, developers, and others concerning floodplain regulations, good building practices, risks of floodplain development, and enforcement matters. Periodic reviews are conducted of local enforcement of floodplain regulations. A newsletter contains information related to floodplain management.
- **Safe Dams Program.** The program covers only a small fraction of the 80,000 dams and water impoundment's in the state. About 4,800 are inventoried (higher than 25 feet or maximum impoundment of 100 acre-feet or more) and 280 are regulated (those that are deemed to potentially cause loss of life in the event of sudden failure). There is no requirement for communities to develop emergency action or maintenance plans. Category I dams are inspected on an unspecified

schedule. All high hazard dams are required to be brought up to state specifications to protect public safety and property.

- **Environmental Protection Division.** Protection of Georgia's air, land, and water is implemented through state and federal authorities. The Division issues and enforces state permits for public and private facilities having to do with water quality, air quality, hazardous waste, water supply, solid waste management, surface mining and other areas.

9.4 Georgia Department of Community Affairs

The Georgia Department of Community Affairs has a number of programs and initiatives that support hazard mitigation:

- Administration of the federal Community Development Block Grant program funds for activities primarily in low and moderate-income target areas. Eligible activities include repair to public facilities, repair to private/public housing, relocation assistance to displaced households, loan assistance to businesses if jobs are threatened and many other arenas. There may also be some engineering advice and technical assistance available to local governments that are planning, designing or implementing hazard mitigation related public works programs, projects or activities.
- The Coordinated Planning Program has responsibility for the overall management of the planning process created by the Georgia Planning Act. In 1989, the General Assembly adopted the Georgia Planning Act as a means to encourage better management of growth in the booming areas of the state while encouraging the less prosperous parts to avail themselves of opportunities for growth.
- The State Comprehensive and Coordinated Planning Program ("Growth Strategies") includes developing and updating minimum standards for comprehensive planning by local governments and for regional planning.
- The Local Building and Industrialized Building Codes department maintains and updates the Georgia State Minimum Standard Codes for Construction and Industrialized Building Codes (including manufactured housing).
- The Uniform Codes Act identifies the fourteen "state minimum standard codes", each consisting of a base code and Georgia amendments; eight codes are mandatory and six are permissive. Under certain conditions, communities may adopt local amendments.

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- The Local Development Fund is a state appropriated grant program that provides matching grants to fund certain community improvement activities such as downtown development projects, public parking facilities, historic preservation projects, tourism and related marketing activities, recreation improvements, community facilities, limited solid waste activities (such as recycling and multi-county planning), activities implementing approved comprehensive plans, and preservation improvements to historic public buildings.

9.5 Georgia Department of Transportation

The Georgia Department of Transportation plans, constructs, maintains and improves the state's road and bridges and provides planning and financial support for other modes of transportation such as mass transit and airports. The majority of the Department's resources are directed toward maintaining and improving the state's network of roads and bridges.

Addressing floodplain and wetlands impacts is a significant element during project planning and design. Road and bridge projects that cross waterways and mapped flood hazard areas are designed to meet FEMA's floodway requirements and limitations. Stand-alone sediment and erosion control plans are prepared for each stage of construction and the Environmental Compliance unit conducts random inspections.

The Department coordinates with GEMA for evacuation planning and when floods and other hazards damage the State's transportation system.

9.6 FEMA National Flood Insurance Program

In 1968, Congress authorized FEMA's National Flood Insurance Program (NFIP) for two primary purposes: (1) to have flood-prone property owners contribute to their own recovery from flood damage through an insurance program; and (2) to guide development such that it is less prone to flood damage. To facilitate implementation, the NFIP created Flood Insurance Rate Maps (FIRMs) that, based on best available information and engineering methodologies, show areas subject to flooding by the 1-percent-annual chance flood (also called the "100-year flood"). Communities use the maps to guide and regulate development. Citizens and insurance professionals use the maps to determine insurance needs.

It is notable that, whereas flood insurance claims are paid when damage is sustained from any qualifying flood event, federal disaster assistance is available only after a flood is determined to be a “major disaster.” A major disaster exceeds state and local capabilities. In addition, disaster grants to individuals and families are limited to approximately \$14,000 (average payment is \$6,000). Therefore, owners of insured buildings that are in areas known to flood, especially as shown on FIRMs, are protected financially as long as they carry sufficient flood insurance coverage. Additional information on flood insurance coverage for property owners and consumers is available online at www.fema.gov/nfip.

Basic federal flood insurance helps pay for property damage and loss of contents. Under certain circumstances – for example, if flood damage causes “substantial damage” – an additional mitigation claim payment is available to help owners bring buildings into compliance with NFIP flood protection standards (as of May, 2003, this additional payment is capped at \$30,000). In addition, compliance is required when a building is substantially improved (includes repair of substantial damage). Substantial improvement is defined as improvements valued at 50% or more of the building’s market value before improvement.

9.7 FEMA Mitigation Grant Programs

In 1988, Congress authorized the first grant program intended to help local jurisdictions and states mitigate the effects of natural hazards. From time to time, additional funds have been authorized by Congress, although generally they are intended to achieve similar purposes and are administered in the same manner.

Pre-Disaster Mitigation Program (PDM). Authorized by the Disaster Mitigation Act of 2000, Pre-Disaster Mitigation grant program funds are expected to be appropriated each year to support a grant program that is funded regardless of disaster experience. As of mid-2003, a Notice of Funding Availability was issued but regulations for the program were not promulgated. The regulations are expected to be similar in most respects to the Hazard Mitigation Grant Program (below). The most significant

difference will be that the funds made available will not be allocated by state immediately after a disaster, but awarded on a nationwide, competitive basis.

Hazard Mitigation Grant Program (HMGP). First authorized in 1988, the Hazard Mitigation Grant Program (HMGP) funds become available after major disasters. The amount of funding is determined as a percentage of certain types of federal assistance (e.g., emergency support, assistance to repair public infrastructures, and assistance to individuals and families). HMGP provides up to 75% of eligible costs, the remaining 25% must come from other, approved sources that may include, including in-kind and property owner contributions. Eligible grantees include local jurisdictions and certain private non-profit organizations.

Eligible projects must solve a given hazard problem, be cost effective, conform with environmental regulations, meet all applicable codes and standards, and be supported by state and local mitigation plans. For the most part, HMGP funds have been used by local jurisdictions to address flood hazards, primarily through acquisition of flood-prone houses and land. Other eligible projects have included elevation-in-place of flood-prone houses, floodproofing of public infrastructure, floodproofing of non-residential buildings, and drainage improvements.

Flood Mitigation Assistance Program (FMA). Specifically authorized by Congress in 1994 to fund projects that are “in the best interests of the NFIP,” the Flood Mitigation Assistance Program (FMA) is funded each year by Congress, regardless of disaster declarations. Funds are available to support planning, technical assistance, and projects.

In recent years, considerable focus has been on projects that address properties known as “repetitive loss properties.” These are properties that have received two or more flood insurance claim payments above a certain value. States receive an annual share of funds from FMA that can be used for acquisition/demolition of flood-prone buildings; elevation-in-place, relocation, or floodproofing of structures (including public structures); and minor flood control projects that do not duplicate activities of other federal agencies.

Part 10 Implementation

10.1 Distribution

The City of Augusta's *Flood Hazard Mitigation Plan* will be posted on the City's Web site (under Planning & Zoning) and notices of its availability will be distributed to the following:

- The federal and state agencies that were notified and invited to participate in Plan development (see Sec. 1.3);
- Adjacent counties and cities; and
- The organizations, agencies, and elected officials who received notices of public meetings.

10.2 Implementation

Throughout the mitigation planning process, the City Departments that are involved in managing hazards and implementing measures to minimize future risk considered a range of mitigation actions. Priority actions were identified (Table 8-1).

For each mitigation action, Table 8-1 identifies the lead agency, support agencies, priority level, and time period for implementation. Each lead agency is responsible for factoring the action into its work plan and schedule over the indicated time period. Annual reports on the status of implementation, including obstacles to progress, will be submitted by lead agencies to the Augusta Emergency Management Agency, with support by the Planning Commission.

10.3 Monitoring & Progress Reports

As part of its responsibilities to coordinate matters related to emergency management, the Augusta Emergency Management Agency is charged with monitoring and preparing progress reports. Progress made on the mitigation action items listed in Table 8-1 will be noted in annual progress reports. The chart in Appendix D will be annotated and copies of the annual report inserted. To this end, the City of Augusta may convene a meeting of the appropriate City departments to discuss and determine progress, and to identify obstacles to progress, if any.

In addition to the scheduled reports, the Emergency Management Agency will convene meetings after floods that cause property damage to review

the effects of such events. Based on those effects, adjustments to the mitigation priorities may be made or additional event-specific actions identified. Such revisions shall be documented as outlined in Section 9.4.

10.4 Revisions

Revisions that warrant changing the text of this Plan or incorporating new information may be prompted by a number of circumstances, including identification of specific new mitigation projects, completion of several mitigation actions, or requirements for qualifying for specific funding. Minor revisions may be handled by addendum.

Major comprehensive review of and revisions to this *Flood Hazard Mitigation Plan* will be considered on a five-year cycle. Adopted in 2003, the Plan will enter its next review cycle sometime in 2007, with adoption of revisions anticipated in 2008. The Mitigation Planning Committee will be convened to conduct the comprehensive evaluation and revision.

The City of Augusta will involve the public in the plan maintenance process and during the major comprehensive review to the Plan in the same ways used during the original plan development. The public will be notified when the revision process is started and provided the opportunity to review and comment on changes to the Plan and priority action items. It is expected that a combination of informational public meetings, surveys and questionnaires, draft documents posted on the web site, and public Commission meetings will be undertaken.

Appendix A

Planning Committee Meeting Minutes

Flood Hazard Mitigation Planning Committee Meeting #1 (June 23, 2003)

The Augusta-Richmond Planning Commission is charged with leading the flood hazard mitigation planning initiative. The Mitigation Planning Committee is composed of six members and supported by staff from appropriate City offices (list follows). Representatives from other agencies and organizations were invited and attended (invited but not attending: FEMA Region IV, Atlanta, GA; U.S. Army Corps of Engineers, Savannah District; Collis Brown, NFIP State Coordinator, GA DNR). The facilitator is Rebecca Quinn of RCQuinn Consulting, Inc.

The Committee convened to review and address the following:

1. What is mitigation planning and why the City is undertaking this task. It is understood that the Plan will build on existing efforts to reduce the effects of flood hazards; the plan is a condition of past receipt of Flood Mitigation Assistance funds and a requirement for eligibility for future mitigation funds. The Mitigation Plan is not an emergency response plan.
2. The planning process was outlined: identify hazards; identify what is at risk; evaluate current policies and procedures; establish a mitigation goal statement, evaluate what else can be done (or can be done differently), identify responsible departments (and possible constraints).
3. Flood hazards were overviewed and comments were made by attendees:
 - a. 20-25% of county is in FEMA-mapped floodplain
 - b. Consensus is the FEMA maps do not adequately depict flooding; City has been advised that Augusta is “highest” priority in FEMA Region IV for revised flood studies/maps
 - c. About 900 flood insurance policies
 - d. Preliminary estimate 4,000 buildings “in” mapped floodplain; many pre-date the ordinance and thus are at-risk
 - e. Several known flood-prone roads
 - f. High water (before “flood” stage) causes infiltration into sewer lines and inflow into manholes, contributing to increased costs.
 - g. Adequate management of the Augusta Canal; closing the Savannah River Levee breaches.
 - h. Past problems evacuating citizens.
 - i. Lack of citizen awareness about what to do.
 - j. I-20 major highway is flood-prone (built in late ‘60s).
 - k. Widely-held public perception that stormwater basins either don’t work as designed or perhaps even contribute to the problem.
 - l. Large portion of industrial base (most are hazardous materials handlers) is in shallow flood-prone areas, affects permitting; industrial chemical tanks have dikes sized for 100-year flood levels (some on the river side).
 - m. Should ensure public housing funds not invested in floodplain areas.
4. A number of on-going projects were touched on: Rae’s Creek channel work; Cranes Creek detention (GDOT project at I-20); several road drainage improvements; South Augusta road ditch improvement. The Augusta Canal intercepts three creeks and has control structures.
5. Local drainage affects some critical locations in the downtown area:
 - a. City police cars were flooded along Augusta Canal
 - b. University Hospital parking lot flooded
 - c. Two locations along Walton Way are low and drainage collects
6. The Committee was asked what the general public knows about flooding and how they know it:
 - a. Frequency of flooding since 1990
 - b. Actually experienced flooding and/or news stories on the local media
 - c. Observe City projects that address drainage, such as Rae’s Creek channel widening and clearance, Cranes Creek detention, and the floodplain buyout program
 - d. State disclosure as part of selling real estate (if seller is asked, have to tell (of past flooding? Of location in SFHA?))
 - e. City now requires floodplain delineation (boundary, BFE and date of map) on plats.

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- f. Homebuyers find out at closing when bank requires flood insurance
 - g. City webpage; materials handed out last flood; various meetings; some active neighborhood associations and civic organizations.
 - h. Flood packets in the libraries
7. How more information about flood hazards will be determined and collected was described: overview of the City's flood hazards using the flood maps (best available information) in the GIS and known problem areas. Inventory of buildings, public buildings and infrastructure, flood-prone roads, hazardous materials sites in the floodplain.
 8. Discussed brief overview of a background handout on mitigation goal (FEMA goal, state goal, goals from the draft Comprehensive Plan, and examples of local goals); need a mitigation goal that is compatible with other City goals (meeting on Friday, June 27, 2003)
 9. Discussed brief overview on background and overview examples of mitigation actions:
 - a. Programmatic and planning
 - b. Public infrastructure and buildings
 - c. Public information
 - d. Site-specific projects
 10. The schedule for the remaining steps in the mitigation planning process was outlined:
 - a. Interview each department (week of June 23)
 - b. Draft a goal statement and discuss opportunities (2nd meeting, June 27)
 - c. Prioritize mitigation actions and review draft plan (3rd and 4th meetings, TBD)
 - d. Get public input (mid-August)
 - e. Finalize plan and recommend adoption (by Aug)
 11. It was emphasized that the Mitigation Plan is not a study to solve a specific problem or to design a specific project; it is to document how the City handles flooding and to look at programs and policies. It may identify specific projects, but that is not a requirement.
 12. The draft PowerPoint presentation for the public meetings was reviewed and modified.
 13. Schedule: Target is to have the draft Plan in acceptable format to submit for review by the Commissioners by the end of August, with final prepared by the end of September.
 - o Second meeting of the Committee scheduled for June 27, 2003

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Flood Hazard Mitigation Planning Committee Meeting #2 (June 27, 2003)

The following was discussed, based in part on the results of the interviews with City staff:

A general review of what is known about flood hazards; GIS mapping is based on the Q3 and is known to have inaccuracies. At this time the City expects to be “high priority” in FEMA Region IV’s plan for map revisions. The Corps of Engineers has restudied four watersheds (Crane Creek, Rae’s Creek, Rocky Creek, and Butler Creek).

1. Some discussion about how hazards are factored into each department’s responsibilities; because the interview notes were circulated late, this discussion was not detailed).
2. Chief Willis, EMA, commented that, after reading the notes, he doubts that citizens have a sense of the breadth of the issues and how budget and manpower shortages affect the City.
3. The “GBA” system will eventually have different layers for different departments, Public Works plans to use it to record drainage complaints to help prioritize efforts to examine solutions. May be useful to maintain records on flooded homes.
4. Doug Cheek, Utilities, mentioned that there are a number of above-ground stream crossings (water distribution and/or sewer collection); in recent years, no damage due to flooding. If the City installs, ductile iron pipe is used; only partial control over installation of private laterals.
5. Chief Willis, EMA, The City does not have a specific evacuation plan for areas known to flood; need to improve the ability to notify people.
6. Norman Michael, Housing & Neighborhood Department indicated floodplain maps will be checked to see if any investments in those areas have been made.
7. Teresa Smith, Public Works, reported on the Corps of Engineers’ study. It was supposed to be completed in FY04; it will now focus on Rocky Creek and Rae’s Creek and examine costs and benefits for a range of alternatives, including non-structural (e.g., acquisition).
8. Teresa Smith, Public Works, reported on the levee closing exercise that was conducted on June 26. It was judged to be “pretty flawless” and the Corps, which oversees the exercise, was pleased. One issue was how people on the river side of the levee were notified; for the exercise it was by newspaper notice; businesses were notified individually. For the purpose of the exercise, public safety concerns prevented closing both openings at Prep Phillips and the opening at Sand Bar Ferry Road (which requires placement of sandbags) was not included. The importance of proper sandbag placement was mentioned.
9. Attendees reviewed the handout on mitigation goal statements and agreed to “vote” on which one to use as a basis to develop Augusta’s statement. It was virtually unanimous to begin with the following statement, and incorporate a sense of the importance of greenspace, sensitive areas, and the City’s efforts to guide development (a draft revision will be circulated for the next meeting):

It is the goal of the City of Augusta, Georgia, to protect public health, safety and welfare and to reduce losses due to flood hazards by identifying flood hazards, by minimizing exposure of citizens and property to flood hazards, and by increasing public awareness and involvement.
10. To begin the process of identifying possible mitigation actions, the following ideas were put on the table. Additional ideas will be circulated before the next meeting:
11. Need systematic method for using and prioritizing mitigation funds, including some factors such as damage history, map data, existing drainage problems, sewer infiltration, proximity to other public openspace.
12. Detention basin maintenance is important to maintain design capacity (recognized will not solve existing flooding and drainage problems).
13. Whether DOT, as part of its wetlands mitigation requirements, could work with the City to target additional buyouts was discussed briefly.
14. The pending DOT project to reduce Rae’s Creek flooding of I-20 (primary hurricane evacuation route) was discussed. It is widely perceived that there were no significant problems before the highway was widened. DOT is designing a project to raise the road surface and increase the culvert capacity

through the embankment to pass the volume of water that currently flows over the road. The project will be designed to maintain existing discharges and thus does not reduce flooding.

15. Different ways that City communicates with the public and specific groups were mentioned, including:
 - Assistant to the City Administrator is the Public Information Officer and communications specialist.
 - The Utilities Department is interviewing public relations companies for a “corporate communications” plan; among anticipated tasks is a survey of citizens regarding effective communication channels.
 - The GIS website gets about 16,000 hits per day (internal and external users, including: realtors, engineers, developers, lenders, attorneys, insurance agents, investors, property owners).
 - All of the City’s development documents are posted on the web.
16. The schedule to complete the Plan was reviewed:
 - Follow up interviews; refine the hazard identification & risk assessment; review documents and regulations.
 - 3rd Meeting: Finalize goal statement; more ideas and discussion about mitigation actions (late July)
 - Early August: review and comment on draft Plan
 - 4th Meeting: Review the Plan; confirm priority actions; recommend to Commissioners (late August)

Name * Committee Member	Organization	Email Address
Terri Turner*	Planning Commission	tturner@augustaga.gov
George Patty*	Planning Commission	gpatty@augustaga.gov
Chief Howard Willis*	Emergency Management	Hw2802@augustaga.gov
Rob Sherman	License & Inspection (director)	RS7872@augustaga.gov
Don Atwell	Public Works/City Engineer	Da10538@augustaga.gov
Norman Michael	HND	Nm9774@augustaga.gov
Doug Cheek	Utilities (Assist Director)	Dc8723@augustaga.gov
Teresa Smith	Public Works (Director)	Ts8816@augustaga.gov
Sid Hatfield	Sheriffs Office	Sh2045@augustaga.gov
Billy Yates	Information Technology	
George Brewer	GA DOT	George.brewer@dot.state.ga.us

Flood Hazard Mitigation Planning Committee Meeting #3 (August 12, 2003)

The following was discussed, based on materials circulated in advance of the meeting:

1. There were no comments on the minutes of Meeting #2.
2. There were no comments on the Agency Interviews and Document/Plan Reviews; only one department has not approved the summaries.
3. There was extensive discussion about the revised goal statement, with final concurrence on a 4-part statement that captures government and citizen obligations and responsibilities.
4. Each of the 12 possible mitigation actions was discussed. The rationale for the action was outlined and the supporting narrative statement and lists of possible sub-actions were modified. There was continuing concern about lack of funding and staff; at this point it was decided to acknowledge that may be an issue, but it would be more quantified when priorities are established.

The schedule to complete the plan was reviewed:

- Continue to “fill in the blanks”
- Prepare final maps and risk information
- Public meeting [August 26]
- 4th Meeting: [August 27] Review final comments on the Plan; confirm priority actions; assign leads; recommend to Commission
- August 29: deliver Final Draft Plan

Name * Committee Member	Organization	Email Address
Commissioner Boyles	Augusta Commission	
Commissioner Cheek	Augusta Commission	
Terri Turner*	Planning Commission	tturner@augustaga.gov
George Patty*	Planning Commission	gpatty@augustaga.gov
Chief Howard Willis*	Emergency Management	Hw2802@augustaga.gov
Al Gillespie	Fire	
Marshall Masters	License & Inspection (director)	RS7872@augustaga.gov
Don Atwell	Public Works/City Engineer	Da10538@augustaga.gov
Norman Michael	HND	Nm9774@augustaga.gov
Doug Cheek	Utilities (Assistant Director)	Dc8723@augustaga.gov
Dennis Ellis	Public Works	
Linda McDonald	Emergency Management	
Sid Hatfield	Sheriffs Office	Sh2045@augustaga.gov
Paul Wasson	Augusta 9-1-1	
Billy Yates	Information Technology /GIS	
Paul DeCamp	Planning Commission	
George Brewer	GA DOT	George.brewer@dot.state.ga.us

Flood Hazard Mitigation Planning Committee Meeting #4 (August 27, 2003)

The following was discussed, based on materials circulated in advance of the meeting:

1. There were no comments on the minutes of Meeting #3.
2. GEMA was notified that the Public Review Draft was posted on the City's webpage; comments have not been received.
3. No members of the general public attended the public meeting (newspaper notice was published and notices sent to adjacent communities, federal and state agencies, and all the neighborhood associations).
4. The matter of "prioritizing" the mitigation actions was discussed. The action were re-ordered, but the consensus is that something can and should be accomplished under each action during the initial 5-year period, even in the face of staff and budgetary constraints. Rather than imply that no action is necessary (e.g., by assigning certain actions to the 5 to 10-year timeframe), the group agreed to retain all as priority actions.
5. The goal statement was reviewed and each action was discussed with respect to which of the four elements of the statement it addressed; a matrix was completed. Although one element of the goal statement (guide development) was specifically addressed by only two actions, it was agreed that the City regularly and aggressively accomplishes this through the land development process. Therefore, having only two additional actions for this element is acceptable.
6. For each of the 11 mitigation actions, lead and support departments/offices were assigned; a generalized estimate of "community support (elected officials and citizens)" was made; brief notes on the status and funding constraints were made; and a very generalized statement about cost effectiveness was assigned. The committee found it difficult to address each of these points due to many unknowns, notably the lack of a staff member who currently has sufficient time to play a leadership role. In addition, while progress on some actions can be made within existing budgets, others will require additional funding or reprogramming of existing funds.
7. The group approved the draft, with appropriate modifications to complete missing content, for "information only" for the Augusta Commission
8. The remaining steps to take the Plan to completion were reviewed, including gaining GEMA approval.

Name * Committee Member	Organization	Email Address
Fred Russell*	Asst City Administrator	frussell@augustaga.gov
Terri Turner*	Planning Commission	tturner@augustaga.gov
George Patty*	Planning Commission	gpatty@augustaga.gov
Chief Howard Willis*	Emergency Management	Hw2802@augustaga.gov
Al Gillespie	Fire	
Rob Sherman	License & Inspection (director)	RS7872@augustaga.gov
Don Atwell	Public Works/City Engineer	Da10538@augustaga.gov
Doug Cheek	Utilities (Assistant Director)	Dc8723@augustaga.gov
Paul DeCamp	Planning Commission	
Ron Houck	Rec & Parks	

Appendix B

Public Outreach Materials

Public Meeting #1: Questionnaire & Summary of Comments



TELL US WHAT YOU KNOW ABOUT FLOODING IN AUGUSTA/RICHMOND COUNTY and SHARE YOUR IDEAS ABOUT REDUCING FLOOD DAMAGE

This questionnaire is to collect information about flooding in your community. Augusta/Richmond County has started to prepare a plan to help reduce flood damage and other safety risks. An important part of the planning process is hearing from our citizens. We will hold a public meeting to present the draft plan sometime in the spring. At that time you will learn about mitigation planning and proposals to reduce damage.

You can help us now. We would like to learn about any flooding problems you may have had at your home or business. Please take a few minutes and answer the following questions. Please use additional paper if your answers will not fit in the spaces provided.

OUR QUESTIONS	YOUR ANSWERS
1. Is your home in the floodplain?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
2. What is the source of flooding?	<input type="checkbox"/> Name of stream or river _____ <input type="checkbox"/> Poor drainage (standing water, overflowing ditches)
3. Do you own or rent?	<input type="checkbox"/> Own <input type="checkbox"/> Rent
4. How would you describe your home?	<input type="checkbox"/> On a crawlspace <input type="checkbox"/> On a slab <input type="checkbox"/> Has a basement <input type="checkbox"/> On wood pilings or block piers <input type="checkbox"/> Manufactured Home <input type="checkbox"/> I don't know <input type="checkbox"/> Other:
5. If your home has actually flooded, when did it happen?	List dates:
6. Describe the damage.	
7. Have you done anything to your home to reduce future damage?	Please describe:
8. In the last flood, did you have flood insurance?	<input type="checkbox"/> Yes <input type="checkbox"/> No
9. Do you now have flood insurance?	<input type="checkbox"/> Yes <input type="checkbox"/> No
10. If you don't have flood insurance, why not?	

OUR QUESTIONS	YOUR ANSWERS
11. Is your business or place of work in the floodplain?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
12. If it has actually flooded, describe the damage.	
13. Please list roads where you've seen flooding.	
14. Describe other flooding problems you know about (such as flooded septic fields, water wells, etc.)	
15. Please give us your ideas to reduce the impacts of flooding.	
16. Do you know about County permits? A permit is required if you want to: <ul style="list-style-type: none"> ▪ Build a new building (even a garage or shed) ▪ Build an addition to an existing building ▪ Make major renovations or repairs ▪ Put fill dirt in a drainage/floodplain area 	<input type="checkbox"/> Yes, I know about permits. <input type="checkbox"/> Please send me more information (address below).

OPTIONAL:

Name: _____

Address: _____

Phone # and/or email: _____

PLEASE MAIL TO OUR CONSULTANT AT:

RCQuinn Consulting, Inc.
153 Prince George St #2
Annapolis, MD 21401-1721

Summary of Public Comments Submitted in Response to Questionnaire:

Waterway	Damage	What we did	Flooded streets	Recommendations
Rae's Creek	Building (\$50-60,000); contents (\$20,000)	Elevated air conditioner; elevated stored contents	Sheffield Circle; Chelsea Dr; Aumond @ Willow Creek	(1) Periodically dredge Rae's Creek; (2) persistent communication with Corps of Engineers for dredging; (3) mandatory preventive maintenance and procedures
Rae's Creek	Flooding inside house; carpet; A/C units	raised A/C as high as possible	Boy Scout; Butler Place	Make both sides of creek the same height; my side is 3-4' lower than opposite side
Rae's Creek	Extensive landscape and yard damage	nothing I can do	Weathers Terrace; East & West Vineland	Dredge the Creek; widen Rae's Creek and riprap like the rest of upper creek
Rae's Creek	14" in house; \$30,000 damage	built dam by creek	Central Ave @ Daniel Field; Bobby Jones @ Wheeler Rd	Widen Rae's Creek; put barriers along banks
Lake Omstead				Dredge Lake Olmstead; island has built up about 2/3 across Lake
Rae's Creek	Property address: 467 Boy Scout Rd; total damage	No, beyond repair; interior is totally destroyed	Boy Scout Road; Ingleside Dr	Govt should purchase property and return to greenspace
Rae's Creek	Interior, floors; exterior furnace & A/C; landscaping	don't know what to do	Chelsea Dr @ Ramsgate Rd; Boy Scout Rd	Make second channel where Rae's and Cranes meet to divert water which now turns sharp angle and rushes over the dam. The dam is much higher than the adjacent land, so land floods
Rae's Creek	n/a	n/a	East Boundary; Wrightsboro Rd-I-20	Improve drainage from roads to ditches. Keep ditches cleaned of debris and heavy grass. Keep creeks cleaned.
Rae's Creek	Water inside 6-22"; removed flooring, sheet rock & insulation up to 4' above floor. Pool wiped out. Workshop and tools lost.	Cannot do anything.	West Lake Forest. Several others in our neighborhood	One side of bank is 3-4' higher, pitching the water to our side (south side)
Rae's Creek	Property addr: 469 Boy Scout Rd. Water was more than 3.5' inside. No longer habitable.	Installed drainage pipes; wrote officials. No longer habitable.	Boy Scout Road & surrounding	Buyout out my property and allow to be wet
springs in area	Water seeps through walls and patio door; foundation cracked; outside building/yard washed away; flooring, appliances, contents	Installed French drains; sealed foundation three times		Find the spring and pipe it
			Milledgeville Rd	Stop filling in areas where water normally flows; put in more holding ponds to control flow

Waterway	Damage	What we did	Flooded streets	Recommendations
Rocky Creek	Property addr: 1919 Clark Dr. Water to 4-feet deep in 1990, furnace destroyed; other floods shallower. No longer habitable. Cannot rent due to flood risk.	Can't do anything; no longer habitable	Clark Drive; Rozella Drive	
Rocky Creek	Water 3-feet deep inside; rotted floors, walls, furniture. Septic overflow	Can't do anything	Gordon Hwy	Keep Rocky Creek cleaned so flow isn't restricted
Rocky Creek	Lost everything; floors buckled. Regularly get 12" in yard and under house		Rozella, Clark Dr, Hopie Rd	Clean out creek, for years has filled up with sand, trees, trash
Rocky Creek		small retaining wall	Clark Drive; Rozella Drive; Hopie Rd	Clean out creek, ponds
Rae's Creek & Cranes Creek	Nearly 2' inside; water with sewage in crawlspace several times; damaged A/C and heating unit twice; contaminated air ducts		Chelsea Dr	
Lake Omstead	1990 houses flooded; now 1-2" rain fills lakes and goes into yards more quickly			Dredge Lake Olmstead (getting petition); sandbar across, plants growing trap more sand.

Appendix C

Savannah River Facility Summary

	Photo #	TAX ID	Grnd Elev*	BFE	BFE-Grnd Elev	Description
Marina Store	1, 2	037-4-001-03-1	130	135	5'	Built in 1994; current brick building (low damage potential except for contents); building valued at \$107,160. No EC on file
Boathouse Community Center (main building, d open pavilion, small building)	3, 4, 5, 6, 7	048-3-071-00-0	130	134	4'	City-owned; old building elevated several feet above grade; lower level is boat storage and useable area overlooking water (windows)
Boat Storage	8, 9	048-0-001-03-0	130	133.5	3.5'	City-owned. Land (\$242k); building (\$98k), PreFab structural steel, built 1955
Welding (large bldg, brick office)	10, 11, 12	048-0-001-05-0	130	133.5	3.5'	Owned by Modern Welding. Land value \$284k; building values \$786k. Office building 1846 sf, built 1975; no specifics on large building.
Unknown	13					Storage tank (on separate parcel?)
Richmond (main building, small bldgs, vacant at rd)	14, 15, 16, 17, 18	048-0-001-01-0	125-130	133.5	8-3.5'	City-owned land (\$1.09 mill) and buildings. Richmond Bonded buildings (\$899k). Wood/steel combined; built 1963 GA Ports Authority building, 1000 sf, \$94k, PreFab Structural steel, built 1955
Traffic Engineering	19, 20	062-0-008-00-0	125-130	133.5	8-3.5'	City-owned. Masonry load bearing; footprint 7,500 sf; built in 1951. Land value \$777k; building value \$124k
Raw Water Pumping Station	21	--	153 (new elevation will be 143)	140.5	above	Up-river from Riverwalk

*Ground Elevation based on gross contour from GIS.



Photo 1. Front of Marina Building



Photo 4. Boathouse Community Center



Photo 2. Restroom portion of Marina Building



Photo 5. Boathouse Community Center



Photo 3. Boathouse Community Center



Photo 6. Downstream of Community Center



Photo 7 Pavilion Downstream Community Center



Photo 10: Modern Welding



Photo 8: Boat Storage



Photo 11: Modern Welding



Photo 9: Boat Storage



Photo 12. Modern Welding Office building



Photo 13. Parcel between Modern & Vacant Bldg



Photo 16. Richmond Warehouse



Photo 14. Vacant Building



Photo 17. Richmond Warehouse



Photo 15. Downstream of Vacant Building



Photo 18. Richmond Warehouse (downstream)



Photo 19. Augusta Traffic Engineering



Photo 20. Augusta Traffic Engineering



Photo 21. Raw Water Pumping Station

Appendix D

Annual Progress Reports

Annual status reports will be prepared, reviewed by the appropriate City officials, and forwarded to the Georgia Emergency Management Agency. The reports will be noted below and copies will be inserted in this appendix.

Comprehensive review and revisions to the *Flood Hazard Mitigation Plan* will be considered on a 5-year cycle.

Date of Progress Report	Summary of Progress Accomplished